

# HEINONLINE

Citation: 43 Fed. Reg. 58945 1978



Content downloaded/printed from  
HeinOnline (<http://heinonline.org>)  
Wed Jul 22 10:09:26 2015

- Your use of this HeinOnline PDF indicates your acceptance of HeinOnline's Terms and Conditions of the license agreement available at <http://heinonline.org/HOL/License>
  
- The search text of this PDF is generated from uncorrected OCR text.

**MONDAY, DECEMBER 18, 1978**

**PART IV**



**Record**

---

**ENVIRONMENTAL  
PROTECTION  
AGENCY**

**Hazardous Waste**

**Proposed Guidelines and  
Regulations and Proposal on  
Identification and Listing**

[6560-01-M]

**ENVIRONMENTAL PROTECTION  
AGENCY**

[40 CFR Part 250]

[FRL 1014.5]

**HAZARDOUS WASTE GUIDELINES AND  
REGULATIONS**

AGENCY: Environmental Protection Agency.

ACTION: Proposed rules.

**SUMMARY:** The Environmental Protection Agency (EPA) today issues proposed rules under Sections 3001, 3002, and 3004 of the Solid Waste Disposal Act as substantially amended by the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580 (Oct. 21, 1976)). These proposals respectively cover: (1) criteria for identifying and listing hazardous waste, identification methods, and a hazardous waste list; (2) standards applicable to generators of such waste for recordkeeping, labeling, containerizing, and using a transport manifest; and (3) performance standards for hazardous waste management facilities. In separate sections of today's FEDERAL REGISTER EPA explains in detail the proposals under Sections 3002 and 3004.

These proposals together with those already published pursuant to Section 3003, (April 28, 1978, 43 FR 18506-18512), Section 3006 (February 1, 1978, 43 FR 4366-4373), Section 3008 (August 4, 1978, 43 FR 34738-34747), and Section 3010 (July 11, 1978, 43 FR 29908-29918) and that of the Department of Transportation pursuant to the Hazardous Materials Transportation Act (May 25, 1978, 43 FR 22626-22634) along with Section 3005 regulations constitute the hazardous waste regulatory program under Subtitle C of the Act.

EPA has chosen to integrate its regulations pursuant to Section 3005 and Section 3006 of the Act with proposals under the National Pollutant Discharge Elimination System required by Section 402 of the Clean Water Act and the Underground Injection Control Program of the Safe Drinking Water Act. This integration of programs will appear soon as proposed rules under 40 CFR Parts 122, 123, 124 and 128.

In addition to the proposals announced today, EPA is publishing in today's FEDERAL REGISTER an Advance Notice of Proposed Rulemaking, that calls attention to suggested expansion of characteristics to be used in identifying hazardous waste under Subtitle C.

**DATES:** Comments are due March 16, 1979. Hearings: listed below.

**ADDRESSES:** Comments should be addressed to: John P. Lehman, Director, Hazardous Waste Management Division, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, Washington, D.C. 20460. Communications should identify the regulatory docket or notice number, such as "Section 3001", Section 3002", etc.

The official record for this rulemaking is available at: Room 2111D, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, and is available for viewing from 9:00 a.m. to 4:00 p.m. Monday through Friday, excluding holidays.

**Hearings:** Five sets of consolidated public hearings on Section 3001-4 proposals are scheduled. The portion of the hearing devoted to Section 3003 will be held jointly with the Department of Transportation.

The schedule and location for the hearings are as follows:

February 7, 8, 9 (1979)—United Engineering Center, Main Auditorium, 345 East 47th Street, New York, N.Y.

February 14, 15, 16—Breckenridge Pavilion Hotel, One Broadway, St. Louis, Missouri 63102, 314-421-1776

February 20, 21, 22—Department of Commerce, Main Auditorium, 14th Street Entrance, Washington, D.C.

March 7, 8, 9—Holiday Inn-Airport, P.O. Box 38218, 4040 Quebec Street, Denver, Colorado 80216, 303-321-6666.

March 12, 13, 14—EPA Regional Office, Sixth Floor Conference Room, 215 Fremont Street, San Francisco, Calif.

A block of rooms has been reserved in St. Louis and Denver for attendees. Please make reservations directly with the hotel by requesting an EPA reserved room at least two weeks prior to the hearing.

An evening session will be held the second day of each hearing to accommodate those who cannot attend during the day. The evening session will cover all four proposed regulations.

The agenda below will generally be followed:

**Day 1:**

Registration—8:00-8:30 a.m.

Section 3001—8:30-5:00 p.m.

**Day 2:**

Continuing Registration—8:00-8:30 a.m.

Section 3002—8:30-12:30

Section 3003—2:00-5:00 p.m.

Section 3001-3004—7:00 p.m.

**Day 3:**

Continuing Registration—8:00-8:30 a.m.

Section 3004—8:30-5:00 p.m.

Anyone wishing to make an oral statement(s) at the hearing(s) should notify, in writing:

Mrs. Geraldine Wyer, Public Participation Officer, Office of Solid Waste (WH-562), U.S. E.P.A., 401 M Street SW., Washington, D.C. 20460.

Please indicate which hearing (location) and the specific regulation(s) that comment(s) will be directed to.

Oral or written comments may be submitted at the public hearings. Persons who wish to make oral presentations must restrict their presentations to ten minutes, and are encouraged to have written copies of their complete comments for inclusion in the official record.

**FOR FURTHER INFORMATION CONTACT:**

Hazardous Waste Management Division, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, Washington, D.C. 20460.

Section 3001—Mr. Alan Corson, 202-755-9187.

Section 3002—Mr. Harry Trask, 202-755-9187.

Section 3004—Mr. Timothy Fields, Jr., 202-755-9296.

**SUPPLEMENTARY INFORMATION:****INTRODUCTION**

The EPA is today proposing the core elements of a major regulatory program to manage and control the country's hazardous waste from generation to final disposal. The Congress directed this action in the Resource Conservation and Recovery Act of 1976 (RCRA), recognizing that disposal of hazardous waste is a crucial environmental and health problem which must be controlled.

In our proposal, we have outlined two sets of requirements: one which sets norms of conduct for Federal and State agencies in implementing the program and the second which sets minimum norms of conduct for those who generate, transport, treat, store, and dispose of hazardous waste.

These requirements, we believe, will close the circle of environmental control begun earlier with regulatory control of emissions and discharges of contaminants to air, water, and the oceans.

We do not underestimate the complexity and difficulty of our proposed regulations. Rather, they reflect the large amounts of hazardous waste generated and the complexity of the movement of hazardous waste in our diverse society. These regulations will affect a large number of industries. Other non-industrial sources of hazardous waste, such as laboratories and commercial pesticide applicators, as well as transporters of hazardous waste, will also be included. The Agency estimates that approximately 270,000 waste generating facilities and 10,000 transporters will be regulated, although only about 30,000 of that number will require treatment, storage, or disposal permits. Under this

program, approximately 35 million metric tons per year of hazardous waste, mainly from industrial sources, will be controlled, while another several hundred million tons per year of high-volume, relatively low risk waste, such as certain mining waste, will be brought under limited control pending further rulemaking.

These proposed controls are necessary to protect public health and the environment. Based on documented damage cases and other data, EPA estimates that disposal of as much as 90 percent of hazardous waste is not currently in accord with these proposed rules.

The Resource Conservation and Recovery Act, under which the Agency is acting, is a demanding statute. It requires promulgating seven regulations providing comprehensive control of hazardous waste from its generation to its final disposal. The statute set a deadline of April 1978 for the promulgation of these regulations, and the Agency has been sued for not meeting that deadline. Our action today is based on the need and the Agency's commitment to act as quickly as possible to create a system to manage hazardous waste.

Our proposal is the result of two years of analysis and consultation by the staff of the Agency with the interested and affected parties throughout State and Federal government and the private sector. In dealing with a new and extremely complex area of environmental regulation, our objective has been to create a program based on as much substantive data and analysis as possible, but even where we have limited data the statute requires that we establish standards and controls.

The fact that the Agency is proposing these rules, however, does not mean that final judgments have been made on the program described in the proposal. A number of issues have been identified, and in some cases alternatives have been suggested, on which we seek public comment.

Further, the Agency anticipates and expects that during the comment period additional issues will be identified and alternatives not described in the proposal will be suggested. The Agency affirmatively solicits comprehensive review during the comment period, in the hope that the final promulgation of these rules will represent the sound exercise of authority granted to us by Congress, and will serve the public interest by protecting human health and the environment in the most efficient and effective way.

The Agency requests comments on all issues raised in the preambles to these regulations and the documents referenced therein, all issues raised by the regulations, and any issues raised in Sections 3001, 3002, and 3004 of the

Resource Conservation and Recovery Act which may not be addressed in today's FEDERAL REGISTER.

Because we are launching this extraordinarily important program, we especially need not only comments but ideas. For instance, one issue raised in this proposal involves balancing the need to protect human health and the environment from the adverse impact of potential mismanagement of small quantities of hazardous waste with the need to hold the administrative and economic burden of management of these wastes under RCRA within reasonable and practical limits.

The Agency has proposed a conditional exclusion of persons who generate and dispose of 100 kilograms per month or less of hazardous waste. Another alternative that has been suggested is to use a 1000 kilograms per month exclusion. These alternatives, however, raise issues which are very difficult to resolve. The Agency recognizes that there is some hazardous waste which if improperly disposed in quantities smaller than 100 kilograms can present a significant threat to public health and the environment. There may be other ways to describe the types and quantities of hazardous waste which should be subject to full controls under this program. The Agency positively solicits such proposals.

A second major issue concerns the impact of these proposed regulations on a small number of industrial product categories. These impacts include the possibilities of plant closures in some of these segments.

The Agency recognizes that it is impossible to change waste disposal practices overnight. We estimate that it will take up to five years for EPA and the States to issue permits to all treatment, storage, and disposal sites. The Act provides for phrasing the regulatory program by authorizing existing sites to obtain interim status under Section 3005. During the interim status period, a facility is subject only to a limited set of requirements pending issuance of a full permit. The Agency has developed implementation plans which would give first priority for permitting to off-site disposal facilities and new facilities, and which would seek to consolidate permitting under RCRA with discharge permits under the Clean Water Act wherever practicable. Furthermore, the Agency expects that many permitted facilities will be placed on compliance schedules under which they will have time to upgrade their facilities. We seek comment on the most desirable strategy for phasing implementation of the Act.

The Agency believes that the States are the preferred level of government for implementation of this program. If

this preference is to be realized, the States need the information and guidance that is contained in this proposal and the promulgated requirements that will follow in order to prepare their programs. Although the Agency recognizes that there are several issues and provisions in these regulations which will be modified before final promulgation, the provisions of these regulations dealing with design and performance standards, and the design of the manifest system, should give the States improved ability to prepare for carrying out this program. In particular, the design and performance standards proposed today should provide a measure for evaluating the adequacy and/or inadequacy of existing and abandoned hazardous waste sites.

One last point concerns the period for public comment. As stated earlier, the Agency is in litigation regarding the schedule for promulgating these regulations. We must anticipate that the Court will issue an order establishing a final promulgation date which may require us to further expedite our work on these regulations. Accordingly, we plan to close the public comment on March 16, 1979, and the public should therefore ensure that the Agency receives all comments by that date.

#### OVERVIEW OF SUBTITLE C

##### HAZARDOUS WASTE CONTROL PROGRAM

The proposals announced today and the Section 3005-6 proposals will, when they are promulgated along with the other rules that have already been proposed, establish a comprehensive system designed to safely dispose of, treat, store or reuse hazardous waste. The statutory authority for these regulations is the Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq. (referred to from time to time as "RCRA" or "the Act"). In a sense EPA is today attempting to "close the loop" on environmental protection: EPA has and the States have substantial programs in place to control air and water pollution, and to restrict unsafe pesticide use. But the ultimate fate of the pollutants removed from the air and water has become a great concern. As Congress stated in Section 1002(b)(3) of the Act:

As a result of the Clean Air Act, the Water Pollution Control Act, and other Federal and State laws respecting public health and the environment, greater amounts of solid waste (in the form of sludge and other pollution treatment residues) have been created. Similarly, inadequate and environmentally unsound practices for the disposal or use of solid waste have created greater amounts of air and water pollution and other problems for the environment and for health.

Virtually every day, the media carries a story on a dangerous situation



resulting from improper disposal of hazardous waste. The tragedy at Love Canal in New York State is but one recent example. EPA has compiled over 400 case studies of the harmful consequences of inadequate hazardous waste management. These cases include incidents of surface and groundwater contamination, direct contact poisoning, various forms of air pollution, and damage from fires and explosions. Nationwide, half of all drinking water is supplied from groundwater sources and in some areas contamination of groundwater resources currently poses a threat to public health. EPA studies of a number of generating industries in 1975 showed that approximately 90% of the potentially hazardous waste generated by those industries was managed by practices which were not adequate for protection of human health and the environment.

The Resource Conservation and Recovery Act of 1976 was passed to address these problems. Subtitle C establishes a comprehensive program to protect the public health and environment from improper disposal of hazardous waste. Although the outline of the programs is to be announced by the Federal government, the Act provides that States with adequate programs can assume responsibility for regulation of hazardous waste. The basic idea of Subtitle C is that the public health and environment will be protected if there is careful monitoring of transportation of hazardous waste, and assurance that such waste is treated or disposed of either at the site where it is generated or after it is carried from that site to a special facility (both on-site and off-site facilities would require permits) in accordance with certain standards, published under Section 3004 (and also proposed today).

The Act requires EPA to define hazardous waste, and to publish standards that generators of such waste must follow so that if the substance is not disposed of where it is generated, every person coming in contact with the waste will know exactly what the waste is, and the quantity. Waste which is defined as hazardous can be disposed of, treated, or stored at the place of generation or at an off-site facility, only in accordance with Federal standards published under Subtitle C, or, after States have assumed the programs, in accordance with those State standards. There are serious consequences if persons subject to this Act do not obey the requirements for recordkeeping and reporting, transportation, or treatment, storage, and disposal.

Launching this Subtitle C program is an ambitious undertaking because there is so much waste and because there are so many people who will be

subject to these regulations (under the regulatory program being proposed today approximately 272,000 waste generators would become subject to the Federal requirements). There are a number of major issues on which EPA seeks assistance from the public. These issues are highlighted in the respective preambles published today. Any regulatory program as large and as new as the hazardous waste program can be expected to require many adjustments on the part of the regulated community. In particular, the requirement that generators of hazardous waste must manage their waste in an environmentally sound manner will create large new demand for adequate hazardous waste management capacity. EPA must take into account the need for more hazardous waste management capacity as it develops this regulatory program because public health and the environment will not be well protected if one of the results of the program is to shut down most of the facilities currently available. EPA also has considered the Administrative feasibility of running a full scale hazardous waste control program. It is concerned that by attempting initial coverage of waste, generators, and disposers that is quite broad, the whole program including addressing the problems brought on by the most hazardous will become bogged down.

Unlike the EPA experience with the Clean Air Act and Clean Water Act, RCRA was not preceded by substantial Federal involvement in the substantive areas covered by RCRA. Nor was there considerable Congressional debate over key provisions in RCRA; indeed, there is not even a Conference Report. Thus, EPA has been forced to make several initial policy decisions without the assistance of clear Congressional direction. One paramount concern does stand out in review of RCRA: Congress believed that the improper management of hazardous wastes is an imminent national problem and the EPA, in its implementation of this new public health legislation, should attempt as quickly as possible to bring hazardous waste transportation and disposal under Federal control. In its definition of hazardous waste, particularly in its listing of specific hazardous waste streams, EPA has not demanded extensive empirical testing of particular substances. Rather, the Agency has relied on a variety of information including knowledge of the substances that enter waste streams as a result of air and water pollution control efforts, to classify those waste streams. In the rules proposed today provision is made for persons who wish to demonstrate by certain tests that their wastes should not be included in Subtitle C coverage.

There are some issues that permeate the Subtitle C program. The first relates to reliance on waste-specific standards versus industry-specific standards. Under the water and air pollution laws regulations are directed at specific private or public sources. Under RCRA, regulations for the most part will be based on standards that do not vary according to the source. EPA experts believe that most waste classified as hazardous requires similar management techniques. This is true not only for the financial and administrative requirements of the program, but also with respect to performance, design, and operating standards for treatment, storage, and disposal facilities. However, it was also determined that some waste can be handled with differing facility design and operating standards or differing administrative requirements, and still be handled in such a way as to meet environmental and public health standards. Further, there is some waste for which insufficient data are available to determine appropriate management techniques. The proposed rules attempt to control this problem by allowing for the following: (1) general standards for transportation, treatment, storage, and disposal applicable to all waste; (2) specific provisions in the treatment, storage, and disposal regulations for different design and operating standards to be used by permit writers in the preparation of permits for specific waste types and facilities as long as an equivalent or greater degree of performance is achieved; (3) deferral of applicability of most of the treatment, storage, and disposal standards for selected high-volume, relatively low risk waste categories (i.e., mining waste, utility waste, gas and oil drilling muds, gypsum piles, and cement kiln dusts) until information is gathered and assessed to determine how they can best be handled; and (4) specific provisions for the large numbers of retailers, farmers, and generators of small quantities of hazardous waste.

The second major issue relates to the possible phasing of the Subtitle C program, such as by first issuing regulations for (or making general regulations first effective with respect to) the most hazardous wastes first. Phasing could be accomplished by addressing only larger (either in terms of number of facilities or amount of waste) industry categories first. To some extent, deference has been paid to phasing by proposing special procedures for mining waste, utility waste, etc. But EPA is not relying on the approach nearly to the extent that it has in implementing the Clean Water Act, for example, where small pollution sources often are excluded altogether from the national pollution regulatory coverage.

A third set of basic issues revolves around the regulatory definition of hazardous waste; this will be analyzed in more detail below.

It is difficult to evaluate any one Section of Subtitle C without appreciating the interlocking function of the seven sections establishing the hazardous waste program. Section 3001 will be explained in some detail in this preamble; it essentially defines those wastes deemed to be hazardous and therefore subjected to Subtitle C. Although in other preambles associated with the other specific proposals, Sections 3002-3006 and Section 3010 are explained; it may assist in understanding Section 3001 if a brief summary of those other provisions is presented.

Subtitle C creates a "cradle-to-grave" management control system for hazardous waste. Solid waste which is excluded from Subtitle C will be subject to the requirements of Subtitle D of the Act, under which open dumping is prohibited and environmentally acceptable practices are required.

Section 3002 addresses the standards applicable to generators. EPA's regulations under this section define generators to exclude individual homeowners and others who produce small quantities of hazardous waste which do not pose a significant threat to human health or the environment. Section 3002 regulations announce the mechanics of the manifest system which will track waste transported from the point of generation to its ultimate disposition.

Section 3003 authorizes standards for transporters of hazardous waste, to assure that such waste is carried carefully. The Agency has attempted to coordinate closely with proposed and current U.S. Department of Transportation (DOT) regulations.

Section 3004 addresses standards affecting owners and operators of hazardous waste treatment, storage, and disposal facilities. These standards define the levels of human health and environmental protection to be achieved by these facilities and provide the criteria against which EPA (or State) officials will measure applications for permits. Facilities on a generator's property as well as off-site facilities are covered by these regulations and do require permits; generators and transporters do not otherwise need permits.

Section 3005 regulations set out the scope and coverage of the actual permit-granting process for facility owners and operators. Requirements for the permit application as well as for the issuance and revocation process are defined by regulations to be proposed under 40 CFR Parts 122, 124, and 128. Sections 3005(e) provides for interim status during the time period that the Agency or the States are re-

viewing the pending permit applications. Special regulations under Section 3004 apply to facilities during this interim status period.

Section 3006 requires EPA to issue guidelines under which States may seek both full and interim authorization to carry out the hazardous waste program in lieu of an EPA-administered program. States seeking authorization in accordance with Section 3006 guidelines need to demonstrate that their hazardous waste management regulations are *consistent with and equivalent in effect* to EPA regulations under Sections 3001-5.

Section 3010 requires any person generating, transporting, or owning or operating a facility for treatment, storage, and disposal of hazardous waste to notify EPA of this activity within 90 days after promulgation or revision of regulations identifying and listing a hazardous waste pursuant to Section 3001. No hazardous waste subject to Subtitle C regulation may be legally transported, treated, stored, or disposed after the 90-day period unless this timely notification has been given to EPA or an authorized State during the above 90-day period. Owners and operators of inactive facilities are not required to notify.

Table I appearing below cross references the numbered sections of the Act to the Subpart designations to be used in the regulations:

TABLE I

Solid Waste Disposal Act as amended  
 Subtitle C—Numbering System  
 Subpart A—Section 3001 Identification, and Listing of Hazardous Waste  
 Subpart B—Section 3002 Standards Applicable to Generators of Hazardous Waste  
 Subpart C—Section 3003 Standards Applicable to Transporters of Hazardous Waste  
 Subpart D—Section 3004 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities  
 Subpart E—Section 3005 Permits for Treatment, Storage, and Disposal of Hazardous Waste  
 Subpart F—Section 3006 Guidelines for Authorized State Hazardous Waste Programs  
 Subpart G—Section 3010 Preliminary Notification of Hazardous Waste Activities.

A "sunshine" philosophy was used in the development of these proposed regulations. Over 85 public meetings have been held throughout the Nation over the past 20 months with participation by industry, citizens, and environmental groups; Federal, State, regional, and local government representatives; and the general public. As the several drafts of each of the regulations proposed today were developed, they were sent for comment to State officials and over 800 industrial concerns and environmental groups. In addition, the EPA Office of Solid Waste and regional office personnel

have made presentations on the philosophy and content of the regulations to literally hundreds of industry, legal, environmental, and State and local government groups at conferences, seminars, and meetings of various kinds. This process has resulted in substantial improvement and refinement of the regulations.

A number of other Federal agencies have participated directly on the EPA working groups which have been responsible for overseeing development of these regulations. The Intergovernmental Regulatory Liaison Group (IRLG) has assisted the Agency in development of test methods for defining hazardous waste and in designation of common codes in Subpart A of the regulations. The Department of Energy has provided significant assistance in regulatory development for utility waste control. The Agency has closely coordinated the content and timing of the Subpart B and C regulations with the Hazardous Material Transportation Act (HMTA) hazardous material regulations developed by the Department of Transportation. In fact, joint public hearings and meetings were held to consider the already proposed Section 3003 and HMTA regulations.

In addition to actual working group involvement by a number of agencies, EPA has participated in more than 40 meetings with Federal agencies concerning development of specific regulations.

State personnel from California, Texas, Illinois, Missouri, Mississippi, Tennessee, South Carolina, Maryland, and New Jersey all participated directly on one or more of the work groups. Meetings were held with State government representatives in every EPA region. In addition, the Agency has maintained close contact with the National Governors' Association subcommittee on hazardous waste on which personnel from approximately 20 States routinely participate. State assistance has been invaluable in developing practical regulations since many of the participating State have had direct experience in implementing similar regulations at the State level.

(40 CFR PART 250 SUBPART A)

SECTION 3001 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

Section 3001 is the keystone of Subtitle C. Its purpose is to provide a means for determining whether a waste is hazardous for the purposes of the Act and, therefore, whether it must be managed according to the other Subtitle C regulations.

Section 3001(b) provides two mechanisms for determining whether a waste is hazardous: a set of characteristics of hazardous waste and a list of particular hazardous wastes. A waste

must be managed according to the Subtitle C regulations if it either exhibits any of the characteristics set out in proposed regulation § 250.13 or if it is listed in § 250.14. (Reference to a section of the regulation will be preceded by "§" and of the Act by "Section".) Also, EPA is directed by Section 3001(a) of the Act to develop criteria for identifying the set of characteristics of hazardous waste and for determining which wastes to list. In this proposed rule, EPA sets out those criteria, identifies a set of characteristics of hazardous waste, and establishes a list of particular hazardous wastes. The Act defines solid waste broadly, so that included are essentially all substances destined for disposal and not regulated by the Federal Water Pollution Control Act or Atomic Energy Act of 1954. One phrase contained in the Act's Section 1004(27) lengthy definition of solid waste that has caused some uncertainty is "other discarded material". For the purposes of this proposed rule, EPA has defined the term "other discarded material" to mean any material which is: (1) not reused (that is, the material is abandoned or committed to final disposition); (2) reused, if such use constitutes disposal (as defined in Section 1004(3) of the Act); or (3) a waste oil (excluding animal or vegetable oil), incinerated or burned as a fuel.

Under this definition, for example, used solvents sent to a solvent reclaiming facility would not be considered a discarded material, and, therefore, would not be considered a solid waste or a hazardous waste. Consequently, the solvent reclaiming facility would not be subject to Section 3004 controls nor would it require a RCRA permit. However, a solvent reclaimer would be a generator subject to Section 3002 regulations if his waste is hazardous. Similarly, empty drums that formerly contained hazardous waste, but which are being delivered for reconditioning and reuse, would not be included. Also, production residues (e.g., chemical intermediates) being prepared for further processing or in the process of being recycled (e.g., through a waste exchange contract), are not considered to be discarded.

The second element of the definition, of "other discarded material" covers material which are reused by placement into or on any land or water so that any constituent thereof may enter the environment. This would include such materials reused as soil conditioners, fertilizers, fill material, dust suppressants, etc. The reuse of materials in this manner could result in serious adverse impacts due to uncontrolled release and dispersion of contaminants into the environment.

Waste oils are singled out for special treatment because the use of waste oils for dust suppression or incineration of these oils has been known to cause serious environmental effects.

The Act defines "hazardous waste" in Section 1004(5) as:

A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may—

(a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

(b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Obviously, this definition cannot by itself provide clear guidance to waste producers as to whether their waste is hazardous. EPA is obligated by Section 3001 to flesh out the criteria for and characteristics of hazardous waste. Section 3001(a) calls for the Federal government to identify the criteria for identifying the characteristics of and for listing hazardous waste. Section 3001(b) then provides two mechanisms for determining whether a waste is hazardous: a set of characteristics of waste and a list of particular hazardous wastes.

Three criteria were used in developing the candidate set of characteristics: that a characteristic was specifically mentioned in Section 3001 or strongly suggested by the definition of hazardous waste in Section 1004(5) of the Act; that damage cases collected by EPA over the past several years demonstrated incidents of harm to human health or the environment attributable to a characteristic or property of waste; or that other government agencies or private organizations which regulate or recommend management methods for hazardous substances have identified a characteristic.

Three criteria were then used for refining the candidate set of characteristics: that the characteristic provides a generally applicable description of a waste property or attribute rather than merely a list of sources; that the likelihood of a hazard developing if the waste is mismanaged is sufficiently great; and that a reliable identification or test method for the presence of the characteristic is available. Use of this last criterion has lead EPA to try to describe each characteristic by specific testing protocols. Where this was not possible (e.g., reactivity), the characteristic is set out as a description readily recognizable by persons working in the field (e.g., "readily capable of detonation at normal temperatures and pressures") together with a test protocol available in cases of uncertainty.

The Agency emphasizes that even after promulgation of these rules, nei-

ther the set of characteristics nor the list are intended by the Agency to be static. Both may be added to or changed by the Agency through the rulemaking process as information develops. In addition, two procedures are built into the Act to provide for public initiation of this process. Section 3001(c) allows any State Governor to petition the Administrator to "identify or list a material as a hazardous waste." Section 7004(a) allows any person to petition the Administrator "for the promulgation, amendment, or repeal of any regulation" under the Act. As both the set of characteristics and the list will be "regulations under the Act" once promulgated, the petition process provided by Section 7004(a) will be available for those seeking changes in the characteristics or the list.

EPA distilled the common features of hazardous waste—when improperly disposed of—into the following groups of candidate characteristics:

1. Ignitability.
2. Corrosivity.
3. Reactivity.
4. Toxicity (using an extraction procedure designed to determine the pollutants that could migrate from a waste when disposed in an open dump environment).
5. Radioactivity.
6. Infectiousness.
7. Phytotoxicity.
8. Teratogenicity and Mutagenicity.

Today EPA proposes to rely only on consideration of the first four characteristics because those are the only ones for which the Agency confidently believes test protocols are available. Also published today is an Advance Notice of Proposed Rulemaking that would, if promulgated, expand the characteristics to include radioactivity, unnatural genetic activity, bioaccumulation, and separate considerations of toxicity to aquatic organisms, terrestrial plants and humans (via chronic exposure to organic chemicals).

The characteristics that EPA plans to use immediately are relatively straightforward, the tests are well developed, inexpensive, and recognized by the scientific community, and they cover a large proportion of the total amount of hazardous waste EPA believes should be controlled. Generators will not be required to test for characteristics of waste outside these characteristics for purposes of determining if the waste is hazardous. However, it was also decided to list specific hazardous wastes using *all* of the candidate characteristics.

Despite its perhaps literal application to these wastes, EPA has deleted from Section 3001 coverage the following categories of materials, relying principally on the legislative history of RCRA, and on the desire to avoid unnecessary duplications with other regulatory programs. The proposed regu-

lations do not apply to agricultural waste, including manure and crop residues, that are returned to the soil as fertilizers or soil conditioners; or to most mining overburden intended for return to the mine site. This limitation in scope is based on the House Committee Report accompanying the House Bill which was a predecessor to the Act. See H. Rep. No. 94-1491, 94th Cong., 2nd Sess. 2 (1976). However, the House Committee Report also states certain mining overburdens may be considered hazardous; thus some are listed in § 250.14.

Sewage sludge from publicly owned treatment works is excluded from coverage under this regulation and will be regulated under Section 405 of the Clean Water Act. Section 1006(b) of the Act directs the Administrator to integrate the regulations under this Act with EPA's other regulatory authority, consistent with the goals and policies of all EPA's authority. EPA's reliance on Section 405 of the Clean Water Act is intended to provide equivalent protection from improperly disposed sewage sludge while avoiding a duplicative permit process.

With those exceptions noted, any solid waste which is described by the characteristics of § 250.13 or is contained on the lists of § 250.14 is a hazardous waste subject to the regulations of this Part. Generators who know or have reason to believe that their waste is hazardous must evaluate their waste against the characteristics. Of course, persons who generate waste specifically described on the list of hazardous wastes need not perform any tests unless they wish to demonstrate that they are not subject to Subtitle C. Similarly, a generator may elect to declare his waste to be hazardous and hence subject to the regulations of this Part without specifically testing against the characteristics or examining the list.

#### WASTE SAMPLING

The results from the testing methods provided in this Subpart are only as valid as the sample of the waste used in the test is representative of the aggregate waste. Since the classification of the waste as hazardous depends on those results, the sampling protocol used is essential to the implementation of this Subpart.

Given the wide diversity of waste types, the large number of manufacturing processes utilized, and the many points along the process stream at which waste can be generated, the Agency does not have the resources or the time to develop sampling protocols for each process stream. In light of this, the Agency considered several alternatives. These included:

(1) Identifying those process streams which are "typical" of those generat-

ing large volumes of hazardous waste and writing exacting protocols for the sampling of these process types.

(2) Identifying the different types of waste matrices that exist and specifying sampling protocols for each matrix type in recognition that the most difficult aspect of sampling relates to the problem of obtaining a representative sample of heterogeneous waste.

(3) Specifying no sampling protocols. The second option has been chosen. This option has several advantages over the first option. It does not leave any industrial segment or process without a sampling protocol specification. Also, since it requires the generator to determine the sampling technique (by deciding what type of matrix the waste is in), it requires the person most familiar with the waste make-up to identify the matrix type. Waste from the same general process can and does vary as to consistency and make-up. If EPA were to specify a particular sampling protocol based on some generalized idea of what the waste matrix usually resembles, the specified protocol might be inappropriate.

However, as long as a protocol is specified for each *type* of waste, such as drummed viscous liquids, tank trucks, lagoons, etc., the sampling protocol will be proper and the Agency has addressed the most important and most difficult aspect of waste sampling.

With that introduction, it is now appropriate to examine the characteristics that EPA has chosen to define hazardous waste:

1. *Ignitability.* The objective of the ignitability characteristic is to identify waste which presents fire hazard due to being ignitable under routine waste disposal and storage conditions. The resulting fires at disposal and storage sites present not only the immediate danger of heat and smoke, but also can initiate explosions, generate toxic vapors, and provide a pathway by which toxic particulates can spread to the surrounding area. The term "ignitable" was chosen to avoid confusion with the Department of Transportation's category of "flammable" in its hazardous materials transportation regulations.

There are several methods used to identify ignitable materials, depending upon the physical state of the materials as a liquid, solid, or contained gas. The one most widely used for liquids, and for which the most background information and verification exists, is use of the flash point of the material. The testing methods available for flash point measurements are also the most reproducible. The flash point proposed as the upper limit for identifying ignitable liquid waste, 140°F or 60°C, was chosen taking into account

the ambient temperatures to which waste may be exposed during management.

EPA has received comments during the development of these regulations emphasizing the need for consistency with DOT definitions for fire hazard. The flash point defining a DOT "flammable liquid" is 100°F (38°C) while that of a "combustible liquid" is 200°F (93°C). Although the DOT limit for "flammable liquid" is adequate for transportation purposes, waste may be subject to much higher temperatures during storage, disposal, or handling incident to waste management; consequently the DOT level is not adequate for the purposes of Section 3001. Comment is solicited on this issue, however.

For waste solids, EPA has proposed a descriptive definition of the properties which make such waste ignitable. This approach was chosen because test methods are not available for ignitable solids which simulate the field conditions to which a waste is subject during handling and management. For waste gases, EPA proposes to use the DOT identification for flammable compressed gases, since the major hazard to the environment arising from flammable gases would be during transport.

2. *Corrosivity.* The corrosivity characteristic is designed to identify waste which must be segregated from other waste because of its ability to extract and solubilize toxic contaminants (especially heavy metals) from other waste, and to identify waste which requires use of special containers because of the danger that such wastes will, over time, corrode the containers in which they are segregated.

While heavy metal solubilization is an extremely complex phenomenon, pH has been found to be its most important indicator. The pH limits chosen in these proposed regulations were based upon skin corrosion limits, aquatic toxicity limits, and heavy metal solubilization data. The metal corrosion limits were taken from DOT Hazardous Materials regulations, because EPA's concern about container damage is identical to that of DOT's in this case. Testing protocols are standard EPA and DOT procedures.

It has been suggested that the corrosivity characteristic address percent acidity and alkalinity as well as pH, so that more information will be provided to the disposer about the capacity of the waste to affect the pH of the surroundings when disposed. Although the Agency feels that such information would certainly be useful for disposal purposes, it does not have an approach as to how percent acidity or alkalinity can be used in assessing the hazard a waste presents. Comments

are solicited as to how percent acidity-alkalinity should be addressed.

The proposed regulations address only liquid waste. The Agency is concerned that solid waste which forms aqueous solutions of high or low pH may also present a danger; information is solicited concerning these dangers from waste solids.

3. **Reactivity.** The objective of the reactive waste characteristic is to identify waste which under routine management presents a hazard because of instability or extreme reactivity. Reactivity includes the tendency to autopolymerize; to create a vigorous reaction with air or water; and to exhibit the following problems: thermal instability with regard to shock, ready reaction to generate toxic gases, and the tendency to explode.

EPA has proposed a descriptive definition of reactive waste, together with test methods for thermal and shock instability.

The largest stumbling block to developing general test methods for use in identifying reactive waste is that while there are many stresses (inputs of energy) that may cause a waste to react or exhibit hazardous properties, there is no one stress that can cause all reactive waste to do so. To compound the problem, the reactivity of a waste sample is not just a function of the composition of the waste, temperature, and the availability of initiating agents. Reactivity is also affected by the mass and geometry of the waste, because these factors may affect its heat transport properties. Thus, the reactivity of a tested waste sample may not necessarily correspond to the reactivity of the waste as a whole.

Since reactive waste is dangerous to the generator's own operations (as well as being hazardous for long term disposal), generators of reactive waste tend to be aware that their waste has that characteristic and that it requires cautious handling. For this reason, EPA feels that in the event that the generator is unsure of the reactivity of the waste, the proposed descriptive definition will be an adequate identification method when used in conjunction with test methods identifying thermal and shock instability.

4. **Toxicity.** The toxicity characteristic is intended to identify waste which, if improperly disposed of, may release toxic materials in sufficient amounts to pose a substantial hazard to human health or the environment.

The concept of toxicity includes several factors:

Unnatural genetic activity (including oncogenic, mutagenic and teratogenic activity);

Potential for bioaccumulation in tissue; or

Acute and chronic toxicity to various organisms, including humans.

The major problem with developing a simple characteristic to address all these factors of toxicity is the difficulty in setting out either a test or a description which could, for example, identify waste causing unnatural genetic activity, without creating a significant number of false negatives and false positives, and without a lengthy testing program. Thus, even though science has advanced to the point where we can identify some oncogenic, mutagenic, teratogenic, and bioaccumulative waste, we do not yet have a relatively simple, well-accepted test or description to reliably identify all waste in those categories. Consequently, EPA has decided to list specific wastes having those properties of toxicity if it can be shown that they may cause harm when improperly managed or can contribute to an increase in morbidity/mortality, and to publish for comment in the ANPR, and set out for future development and incorporation in the general hazardous waste characteristics, the other aspects of toxicity. As further information is obtained and quantitative measurement techniques are developed, these other aspects probably will be added as characteristics of hazardous waste.

Since the most likely pathways for exposures to waste contaminants are leaching to groundwater or surface runoff, the only aspect of toxicity proposed for control now as a waste characteristic is chronic toxicity to humans. This toxicity characteristic is based on an Extraction Procedure, assumed forms of contamination, and reference to the EPA National Interim Primary Drinking Water Standards.

The statutory definition of hazardous waste in Section 1004(5) requires EPA to make a judgment as to the hazard posed by a waste "when improperly treated, stored, transported, or disposed of, or otherwise managed." For waste containing toxic constituents, this hazard is dependent on two factors: the intrinsic hazard of the constituents of the waste, and the release of the constituents to the environment under conditions of improper management.

Leachate formation and runoff are the pathways most often responsible for the contamination of the environment from hazardous waste. To assess the hazard posed by these routes of contamination, EPA has developed a procedure to measure the tendency of the constituents of a waste to migrate out and become available to contaminate the environment under poor management conditions. This procedure has been termed the Extraction Procedure (EP). It was the original intent of the Agency to develop an extraction procedure which closely modeled the effects of indiscriminate land disposal; these include weathering of

the waste and biological activity in the land disposal environment. The various procedures developed to model these conditions proved to be incompatible with the bioassay techniques contemplated (for ultimate inclusion in regulation and as noted in the ANPR published today). The Agency is still considering this approach and is continuing its research; also the Agency is working closely with the American Society for Testing and Materials (ASTM) in its development of extraction procedures for use in the permit process, as well as other parts of the testing protocols.

The EP that is included in the proposed rulemaking has been designed to "model" improper management by simulating the leaching action of rain and groundwater in the acidic environment present in landfills or open dumps. It does not necessarily address any one actual disposal method that may be used in a particular circumstance, but is based on a modification of disposal conditions which resulted in documented damage cases.

The extract resulting from the EP is available to undergo whatever toxicity test is specified in the regulation. This procedure is designed to allow a more realistic assessment of the hazard from waste having toxic constituents than would direct testing of the waste. It is designed to encourage the chemical or physical "fixing" of waste so that its constituents are no longer available to be leached out, and to insure coverage by the Subtitle C system of waste which might not test out as hazardous directly, but whose hazardous constituents can be released under poor management conditions.

Some commenters have suggested that the EP approach is overly stringent in defining hazardous waste, since all is required to be managed properly at facilities in accordance with the Section 4004 Land Disposal Criteria in Subtitle D of the Act. However, the Agency believes the EP approach is necessary, because only waste designated as hazardous is subject to transport controls as well as disposal controls. While non-hazardous waste may be managed properly at facilities subject to Subtitle D controls, there is not guarantee that such waste will, in fact, be delivered to such facilities. Thus, waste which has the potential to cause significant human health and environmental damages if not managed properly, i.e., if not delivered to a Subtitle C facility, is considered to be hazardous waste.

To analyze a waste for chronic toxicity to humans, EPA relates levels of contaminants in the EP extract to potential environmental concentrations and to levels that are believed to be hazardous to humans. For the purposes of determining potential chronic



toxicity to humans, EPA assumes disposal of the waste in a nonsecure landfill or dump (one in which there is no functional barrier which prevents subsurface movement of leachate, e.g., a sand or gravel pit) which is situated directly over a usable aquifer that is source of a drinking water. Once he EP has been applied to the waste, allowing the assessment of the availability of the contaminant to the environment, a dilution factor is then applied in an effort to roughly duplicate actual human exposure. Use of this groundwater model to assess contamination is not meant to imply that other contamination routes are not also of concern. However it is considered a reasonable indicator of risk. Toxic waste whose hazard is through another route can and will be listed based on Section 1004(5) of the Act.

In general, when contaminants leach into groundwater, they form a plume of contaminated water which extends down-gradient from the contaminated source. The shape and size of a plume depends upon the local geology, the groundwater flow, the type and concentration of contaminants, and the continuity of waste disposal. Any modifications of the groundwater system made by human activities, such as well pumping from a point source, will cause the plume to become elongated. Where the flow is low, contamination will tend to spread more laterally to form a somewhat wider plume. Irregular plumes can be created by local influence such as location of pumping wells and variations in permeability. An important aspect of groundwater contamination is that it may persist underground for years, decades, or even centuries; this is in marked contrast to most surface water pollution. The average residence time of groundwater may be on the order of 200 years; consequently, a contaminant which is not readily degraded or sorbed underground can remain as a degrading influence on the resource for indefinite periods.

For the purposes of calculating the dilution that a leachate plume would undergo between the time it enters the underground aquifer until it reaches a well, it was assumed that wells will be situated no closer than 500 feet from the disposal site. Examination of the available data indicated that a 10-fold dilution factor, while probably conservative, would be reasonable. It should be emphasized that there are instances where dilution has been higher as well as cases where it has been lower at a distance of 500 feet.

Based on this model, before human exposure is expected to occur, the leachate from the waste would become diluted by a factor of 10. Thus, in order to protect human health, the maxi-

mum allowable contaminant concentration permissible in the EP extract would be 10 times the level that would be acceptable in drinking water. Consequently, waste whose EP extract shows more than 10 times the levels of certain contaminants allowed by the EPA National Interim Primary Drinking Water Standards (40 CFR Part 141) will be considered to be hazardous.

The EPA National Interim Primary Drinking Water Standards, promulgated pursuant to the Safe Drinking Water Act, are being revised. The Agency intends to change the identity and/or levels of contaminants in the Extraction Procedure extract which cause a waste to be considered hazardous to reflect these revisions, or any future revisions. Further, the Agency is considering using the Water Quality Criteria of the Clean Water Act, in addition to the Primary Drinking Water Standards, as a basis for setting levels of contaminants in the EP extract leading to hazardous waste classification. Public comment on this concept is solicited.

The Agency emphasizes that the toxicity characteristic discussed above, based on the Extraction Procedure, assumptions of mismanagement, and a linkage to the drinking water standards, is a *screening mechanism* designed to sort out solid waste which deserves special management, including transportation controls, provided by Subtitle C. Many commenters on drafts of these regulations have missed the point of this screening technique by saying, in effect, that their waste is managed in a much better way than indicated in the screening process, and therefore that their waste should not be considered hazardous. If a waste identified as hazardous by this characteristic is properly managed now, there will be no problem in obtaining a permit to continue present practice. Further, the Section 3004 regulations have a great deal of built-in flexibility to allow variations from the standards, so long as equivalent control can be demonstrated, for specific waste in specific management situations.

#### HAZARDOUS WASTE LISTINGS

A waste is identified as hazardous either because it exhibits one of the characteristics or because it appears on the list of hazardous waste. Both particular wastes and sources or classes of waste streams appear on the list. EPA has chosen to emphasize waste streams rather than specific hazardous substances wherever possible because industrial wastes tend to be complex mixtures, containing many different components, only some of which may exhibit hazardous characteristics. This approach will relieve

waste generators of much of the testing burden and uncertainties which are involved in relating a waste containing many substances to a list of specific substances.

A solid waste, or source or class of solid waste is listed if the waste:

(1) Possesses any of the characteristics identified in proposed 40 CFR § 250.13, and/or

(2) Meets the statutory definition of hazardous waste.

As noted earlier, one branch of the statutory definition of hazardous waste relies on judgements of the overall character and risk of the waste when improperly managed. Over the past several years, EPA has documented several hundred cases of damage to human health or the environment resulting from improper management of waste. Damage cases such as these can be, and in many cases have been, used as the basis for listing of certain hazardous waste. In effect, these cases serve as alternates to the Extraction Procedure-contamination analysis discussed above, and are other facets of the hazardous waste definition process.

The list proposed today is only a first step, and is subject to revision through the rulemaking process. As EPA determines waste which meets the criteria listed above, it will be added to the lists. This process may be initiated independently by EPA, by State Governors pursuant to Section 3001(c), or by a citizen petition pursuant to Section 7004(a).

#### DEMONSTRATION OF NON-INCLUSION IN SUBTITLE C

The Agency recognizes that individual waste streams may vary depending on raw materials, industrial processes and other factors. Thus, while a waste generally described in these proposals may be hazardous, a specific waste from an individual facility may not be. For this reason, proposed 40 CFR § 250.15 provides a mechanism for persons to demonstrate that a specific waste should not be included in the Subtitle C regulatory control system.

The person seeking relief must perform the test(s) described for those characteristic or properties indicated by the code(s) following the listing. The waste stream must be non-hazardous according to the results of each characteristic or property tested, and the test results must be certified to the EPA Administrator.

#### COMMON CODING

The Agency is engaged in an extensive internal program to provide a common coding system for all materials which it regulates under each of its regulatory statutes. This program involves other Federal regulatory agencies as well. In cooperation with the

## PROPOSED RULES

Chemical Abstract Service, the Agency intends to provide a code for each listed waste or waste stream to facilitate data management both by those regulated and by the Agency. Although the codes are not available at this time, the Agency intends to include the codes in its final promulgation, if they are available then.

## ENFORCEMENT

In an enforcement action under Section 3008 of the Act, involving a waste specifically listed in § 250.14 of these regulations, the government need only show that the waste is on the list and that it is being transported, disposed of, treated, etc. in violation of the requirements of this Part. The government does not have a burden of demonstrating that the waste is hazardous, and the question whether the waste is properly on the list is not an issue relevant to an enforcement proceeding. That issue may be resolved only by petition under Section 7004(a) of the Act, or under § 250.15 of this Part, and any subsequent judicial review of the Agency determination under these provisions.

The Agency believes that waste composition may change over time because of changes in the waste-producing process. Therefore, EPA expects persons who generate waste to regularly check the waste against the hazardous waste characteristics and the list to confirm that the waste is not hazardous.

EPA intends to check those persons who have claimed that they do not generate a hazardous waste to determine whether the claim is accurate. If EPA discovers that such a person is generating a hazardous waste, and there is not pending a request for a determination that the waste is improperly listed, pursuant to § 250.15, for which the Administrator has granted a stay under § 250.15(h), he will be treated as any other violator who has failed to manage his hazardous waste pursuant to the Subtitle C requirements. The Agency also tends to act on citizen complaints evidencing failure to properly manage hazardous waste.

## BACKGROUND DOCUMENT

A background document is being developed in support of these proposed rules. This document is in the draft stage, and is subject to change as new data and information are received. Copies of the draft will be available for review in the EPA Regional Office libraries and in the EPA library reading room, Room 2404, Waterside Mall, 401 M Street, SW., Washington, D.C.

## ECONOMIC, ENVIRONMENTAL, AND REGULATORY IMPACTS

In accordance with Executive Orders 11821, as amended by Executive Order 11949, and OMB Circular A-107, EPA policy as stipulated in 39 FR 37419, October 21, 1974, and Executive Order 12044, respectively, analyses of the economic, environmental, and regulatory impacts are being performed for the entirety of Subtitle C, Hazardous Waste Management. Drafts of these analyses have been completed and will be available for review by January 8, 1979, in the EPA Regional Office libraries and the EPA library reading room, Room 2404, waterside Mall, 401 M Street, S.W., Washington, D.C. Final versions of these documents will be issued at the time of promulgation.

Dated: December 11, 1978.

DOUGLAS COSTLE,  
Administrator.

It is proposed to amend Title 40, CFR, Part 250 by adding a new Subpart A consisting of Sections 250.10-250.15 as follows:

## PART 250—HAZARDOUS WASTE GUIDELINES AND REGULATIONS

## Subpart A—Identification and Listing of Hazardous Waste

- Sec.  
250.10 Purpose, scope, and applicability.  
250.11 Definitions.  
250.12 Criteria.  
250.13 Hazardous waste characteristics.  
250.14 Hazardous waste lists.  
250.15 Demonstration of non-inclusion in the hazardous waste system.

## FIGURES

- Figure 1—Compaction Tester.  
Figure 2—Extractor.

## APPENDICES

- Appendix I—Sampling Methods.  
Appendix II—Explosion Temperature Test.  
Appendix III—Selected Cancelled and RPAR Pesticides.  
Appendix IV—Selected Department of Transportation (DOT) Classification Poison A, Poison B, and ORM-A Substances.  
Appendix V—Selected Priority Pollutants.  
Appendix VI—Center for Disease Control (CDC) Classification of Etiologic Agents.  
Appendix VII—Infectious Waste Treatment Specifications.  
Appendix VIII—Radioactive Waste Measurements.  
Appendix IX—Controlled Substance List.  
Appendix X—Mutagenic Activity Detection.  
Appendix XI—Bioaccumulation Potential Test.

AUTHORITY: Sections 1006, 2002(a), and 3001, Pub. L. 94-580, 90 Stat. 2802, 2804, 2806, (42 USC 6905, 6912, 6921).

## Subpart A—Identification and Listing of Hazardous Waste

## § 250.10 Purpose, scope, and applicability.

(a) The purpose of these regulations is to describe the characteristics and lists which shall be used when appropriate by a waste generator, transporter, or owner/operator of a waste treatment, storage, or disposal facility to determine if the waste he handles is a hazardous waste subject to the regulations of this Part.

(b) Hazardous waste as defined in § 250.11(b)(3) is a subset of solid waste which is defined in Section 1004(27) of the Act. The term "other discarded material" in the solid waste definition (1004(27)) has been defined by EPA to mean any material which:

(1) Is not re-used (that is, is abandoned or committed to final disposition), or

(2) Is re-used (including materials treated prior to re-use)

(i) If such re-use constitutes disposal (as defined in the Act), or

(ii) If the material is:

(A) Used lubricating, hydraulic, transformer, transmission, or cutting oil which is incinerated or burned as a fuel.

(B) [Reserved]

NOTE.—Other materials and their uses will be included by amendment to this list upon a finding by the EPA that it is necessary to control such uses.

(c) In order to receive EPA approval under Subpart F (State Program Requirements) States must demonstrate that their programs contain standards and procedures which identify as hazardous at least the same universe of wastes defined as hazardous by the characteristics and lists in this Subpart. In evaluating State application for full authorization, the Regional Administrator will evaluate whether the State program will cover the wastes covered by this Subpart. A finding that any waste defined as hazardous by this Subpart is not so defined by a State program will constitute a *de facto* finding of a less stringent State program and may provide the basis for rejection of a State's authorization. Additionally, where State programs are approved, EPA retains independent authority to enforce the standards in this Subpart pursuant to Section 3008 of the Act.

(d) To the degree specified below, these regulations impose certain duties upon persons who generate solid waste which is ignitable, corrosive, reactive, or toxic (as defined in § 250.13 of this subpart), or which is listed in § 250.14 of this subpart.

(1) Except as provided herein, all generators of solid waste who know or have reason to believe that their waste is hazardous shall evaluate their waste in accordance with the characteristics

set forth in § 250.13. Generators of solid waste who find their waste to be hazardous following such evaluation, and who meet the definition of hazardous waste generator in Subpart B of this Part, shall comply with the requirements of Subparts B and G of this Part.

**NOTE.**—Retailers, farmers, and persons who generate and dispose of less than 100 kilograms per month are only regulated as defined in § 250.29.

(i) Generators of solid waste may elect to declare their waste hazardous and subject to the regulations of this Part. In these cases, generators need not perform the specified evaluation.

(ii) Persons who generate waste listed under § 250.14 are deemed to be generators of hazardous waste and need not perform the specified evaluation. However, they may demonstrate that their waste is not hazardous and, therefore, not subject to the regulations of this Part by meeting the requirements of § 250.15.

(iii) Generators who determine that their waste is not hazardous shall retain copies of the evaluation performed and shall repeat the necessary evaluation or testing when there is a significant change in their feed materials or operations which may alter the test results.

(iv) A generator of solid waste which is listed under § 250.14 who has demonstrated that his waste is not hazardous under § 250.15 shall repeat the necessary testing annually in addition to repeating it under the circumstances described in paragraph (iii) above.

(v) If a waste is found or declared to be hazardous, all applicable data (including test results, if available) shall be reported to the EPA Regional Administrator, and the generator shall comply with the requirements of Subparts B and G of this Part.

(vi) A determination that a waste is not hazardous under paragraphs (i) through (iv) above does not preclude a later determination by EPA, using the characteristics and testing methods set forth in § 250.13, that the waste is hazardous. In these cases, EPA will notify the generator of its determination and assign the generator an identification number if he does not already have one.

(2) Notwithstanding any of the above:

(i) Agricultural wastes, including manures and crop residues, which are returned to the soil as fertilizers or soil conditioners are not subject to the regulations of this Part.

(ii) Overburden resulting from mining operations and intended for return to the mine site is not subject to the regulations of this Part unless specifically listed in § 250.14.

(iii) Pursuant to Section 1006 of the Act (42 USC 6905), sewage sludge from publicly owned treatment works is not subject to these regulations and will be regulated pursuant to the guidelines promulgated under Section 405(b) and (d) of the Clean Water Act.

#### § 250.11 Definitions.

(a) When used in this Subpart, the following terms have the meanings given in the Act:

- (1) "Administrator"—Sec. 1004(1)
- (2) "Disposal"—Sec. 1004(3)
- (3) "Federal Agency"—Sec. 1004(4)
- (4) "Hazardous waste management"—Sec. 1004(7)
- (5) "Person"—Sec. 1004(15)
- (6) "Sludge"—Sec. 1004(26A)
- (7) "Solid waste"—Sec. 1004(27)
- (8) "Solid waste management"—Sec. 1004(28)
- (9) "State"—Sec. 1004(31)
- (10) "Storage"—Sec. 1004(33)
- (11) "Treatment"—Sec. 1004(34)

(b) Other terms used in this Subpart have the following meanings:

(1) "Act" means the Solid Waste Disposal Act as amended by the Resources Conservation and Recovery Act of 1976, Public Law 94-580.

(2) "Equivalent method" means any testing method which the Administrator determines to be functionally equivalent or superior to the method specified.

(3) "Hazardous waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in this Subpart.

(4) "Publicly owned treatment works" or "POTW" means a treatment works as defined by Section 212 of the Clean Water Act (CWA), which is owned by a State or municipality (as defined by Section 502(4) of the CWA). This definition includes any sewers that convey wastewater to such a treatment works, but does not include pipes, sewers or other conveyances not connected to a facility providing treatment. This term also means the municipality as defined in Section 502(4) of the CWA, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

(5) "Representative sample" means any sample of the waste which is statistically equivalent to the total waste in composition, and in physical and chemical properties. Representative samples may be generated using the methods set out in Appendix I of this Subpart.

(6) "Triple rinsed" refers to containers which have been flushed three times, each time using a volume of diluent at least equal to ten percent of the container's capacity.

#### § 250.12 Criteria.

(a) *Criteria for identifying the characteristics of hazardous waste.* A characteristic of hazardous waste will be established under § 250.13 where, based on information from damage incidents or scientific and technical information, the Administrator determines that:

(1) The characteristic can be defined in terms of specific physical, chemical, toxic, infectious, or other properties of a solid waste that will cause the waste to be a hazardous waste pursuant to the definition in Section 1004(5) of the Act, and

(2) The properties defining the characteristic are measurable by standardized and available testing protocols applicable to waste.

(b) *Criteria for listing hazardous waste.* A solid waste, or source or class of solid waste, will be listed as a hazardous waste in § 250.14 if the Administrator determines that the solid waste:

(1) Possesses any of the characteristics defined in § 250.13, and/or

(2) Meets the definition of hazardous waste found in Section 1004(5) of the Act.

(c) *Petitions.* The petition by a State Governor (under Section 3001(c) of the Act) or by a person (under Section 7004(a) of the Act) to identify a characteristic or list a solid waste as a hazardous waste will be granted if the Administrator determines that the waste which is the subject of the Petition meets the criteria of paragraphs (a) or (b) above.

#### § 250.13 Hazardous waste characteristics.

(a) *Ignitable waste.* (1) *Definition.*—A solid waste is a hazardous waste if a representative sample of the waste:

(i) Is a liquid and has a flash point less than 60°C (140°F) determined by the method cited below or an equivalent method, or

(ii) Is not a liquid and is liable to cause fires through friction, absorption of moisture, spontaneous chemical changes, or retained heat from manufacturing or processing, or when ignited burns so vigorously and persistently as to create a hazard during its management, or

(iii) Is an ignitable compressed gas as defined in 49 CFR 173.300(b), or

(iv) Is an oxidizer as defined in 49 CFR 173.151.

(2) *Identification method.* (i) Flash point of liquids shall be determined by a Pensky-Martens Closed Cup Tester, using the protocol specified in ASTM Standard D-93-72, or the Setaflash Closed Tester using the protocol specified in ASTM standard D-3278-73 or any other equivalent method as defined in this Subpart.



(ii) Ignitable gases shall be determined by the methods described in 49 CFR 173.300.

(b) *Corrosive waste.* (1) *Definition*—A solid waste is a hazardous waste if a representative sample of the waste:

(i) Is aqueous and has a pH less than or equal to 3 or greater than or equal to 12 as determined by the method cited below or an equivalent method, or

(ii) Corrodes steel (SAE 1020) at a rate greater than 0.250 inch per year at a test temperature of 130°F as determined by the method cited below or an equivalent method.

(2) *Identification method.* (1) pH shall be determined using a pH meter, following the protocol specified in the "Manual of Methods for Chemical Analysis of Water and Wastes" (EPA-625-16-74 003).

(ii) Rate of metal corrosion shall be determined using the protocol specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69.

(c) *Reactive waste.* (1) *Definition*—A solid waste is a hazardous waste if a representative sample of the waste:

(i) Is normally unstable and readily undergoes violent chemical change without detonating; reacts violently with water, forms potentially explosive mixtures with water; or generates toxic gases, vapors, or fumes when mixed with water; or is a cyanide or sulfide bearing waste which can generate toxic gases, vapors, or fumes when exposed to mild acidic or basic conditions.

(ii) Is capable of detonation or explosive reaction but requires a strong initiating source or which must be heated under confinement before initiation can take place, or which reacts explosively with water.

(iii) Is readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.

(iv) Is a forbidden explosive as defined in 49 CFR 173.51, a Class A explosive as defined in 49 CFR 173.53, or a Class B explosive as defined in 49 CFR 173.58.

NOTE—Such waste includes pyrophoric substances, explosives, autopolymerizable material and oxidizing agents. If it is not apparent whether a waste is a hazardous waste using this description, then the methods cited below or equivalent methods can be used to determine if the waste is hazardous waste.

(2) *Identification method.* (1) Thermally unstable waste can be identified using the Explosion Temperature Test cited in Appendix II of this Subpart (waste for which explosion, ignition, or decomposition occurs at 125°C after 5 minutes is classed as hazardous waste).

(ii) Waste unstable to mechanical shock can be identified using the Bureau of Explosives impact apparatus and the tests cited in 49 CFR 173.53(b), (c), (d), or (f), as appropriate.

(d) *Toxic waste.* (1) *Definition*—A solid waste is a hazardous waste if, according to the methods specified in paragraph (2), the extract obtained from applying the Extraction Procedure (EP) cited below to a representative sample of the waste has concentrations of a contaminant that exceeds any of the following values:

Contaminant:	Extract level, milligrams per liter
Arsenic.....	0.50
Barium.....	10.0
Cadmium.....	0.10
Chromium.....	0.50
Lead.....	0.50
Mercury.....	0.02
Selenium.....	0.10
Silver.....	0.50
Endrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5, 8-di methano naphthalene).....	0.002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane gamma isomer).....	0.040
Methoxychlor (1,1,1-Trichloroethane 2,2-bis (p-methoxyphenyl)).....	1.0
Toxaphene (C <sub>12</sub> H <sub>8</sub> Cl <sub>4</sub> -technical chlorinated camphene, 67-69 percent chlorine).....	0.050
2,4-D (2,4-Dichlorophenoxyacetic acid).....	1.0
2,4,5-TP (2,4,5-Trichlorophenoxypropionic acid).....	0.10

NOTE—Extract levels specified for the above substances equal ten times the EPA National Interim Primary Drinking Water Standards for these substances. These standards are being revised. Extract levels specified above will be changed to reflect revisions to these standards. Also, EPA is considering use of the Water Quality Criteria under the Clean Water Act as a basis for setting extract levels, in addition to the EPA National Interim Primary Drinking Water Standards.

(2) *Identification method.* (1) *Extraction procedure.* (A) Take a representative sample (minimum size 100 gms) of the waste to be tested and separate it into its component phases using either the filtration method or the centrifugation method described in this section. Reserve the liquid fraction under refrigeration at 1-5°C (34-41°F) for use as described in paragraph (F) of this section:

(1) *Filtration Method.*

*Equipment:* Millipore YY22 142 30 filter holder (Millipore Corp., Bedford, MA 01730) equipped with an XX42 142 08 accessory 1.5 liter reservoir, or Nuclepore Corp., Pleasanton, CA 94566) equipped with a 1.5 liter reservoir, or equivalent filter holder.

*Procedure:* 1. Using the filter holder place a 0.45 micron filter membrane (Millipore type HAWP142, Nuclepore type 112007, or equivalent) on the support screen. On top of the membrane (upstream) place a prefilter (Millipore AP25124, Nuclepore P040, or equivalent). Secure filter holder as directed in manufacturer's instructions.

2. Fill the reservoir with the sample to be separated, pressurize to no more than 75 psi (7 kg/cm<sup>2</sup>), and filter until no significant amount of fluid (5 ml) is released during a 30 minute period.

3. After liquid flow stops, depressurize and open the top of the reservoir, invert the filter unit, replace filter pads as in step 1. above, and resume filtering. Save pads for later use. Repeat this step until no more fluid can be removed from the waste at a pressure of 75 psi (7 kg/cm<sup>2</sup>).

4. Take the solid material, and any pads used in filtration, and extract as described in paragraph (B). Subtract tare weights of filter pads in calculating the amount of solid material.

(2) *Centrifugation Method*

*Equipment:* Centrifuge (e.g. Damon-IEC catalog no. 7165, Damon-IEC Corp., Needham Heights, MA, or equivalent) equipped with a rotor for 600 ml to 1 liter containers (Damon-IEC catalog no. 976, or equivalent). For flammable material containing wastes, explosion proof equipment is recommended.

GLASS CENTRIFUGE BOTTLES

*Procedure:* 1. Centrifuge sample for 30 minutes at 2300 rpm. Hold temperature at 20-40°C (68-104°F).

2. Using a ruler, measure the size of the liquid and solid layers, to the nearest mm (0.40 inch). Calculate the liquid to solid ratio.

3. Repeat 1 and 2 above until the liquid: solid ratio calculated after two consecutive 30 minute centrifugations is within 3%.

4. Decant or siphon off the layers and extract the solid as described in paragraph B.

(B) Take the solid portion obtained in paragraph (1), and prepare it for extraction by either grinding it to pass through a 9.5 mm (3/8") standard sieve or by subjecting it to the following structural integrity procedure.

STRUCTURAL INTEGRITY PROCEDURE

*Equipment:* Compaction tester having a 1.25 inch diameter hammer weighing 0.73 lbs. and having a free fall of 6 inches (Figure 1) (one suitable device is the Associated Design and Manufacturing Company, Alexandria, Va. 22314, catalog no. 125).

*Procedure:* 1. Fill the sample holder with the material to be tested. If the waste sample is a monolithic block, then cut out a representative sample from the block having the dimensions of a 1.3" dia. x 2.8" cylinder.

2. Place the sample holder into the Compaction Tester and apply 15 hammer blows to the sample.

3. Remove the now compacted sample from the sample holder and transfer it to the extraction apparatus for extraction.

(C) Take the solid material from paragraph (B), weigh it and place it in an extractor. A suitable extractor will not only prevent stratification of sample and extraction fluid but also insure that all sample surfaces are continuously brought into contact with well mixed extraction fluid. (When operated at greater than or equal to 40 rpm, one suitable device is shown in figure 2 and available as Part No. 3736 produced by the Associated

Design and Mfg. Co., Alexandria, Va. 22314.)

(D) Add to the extractor a weight of deionized water equal to 16 times the weight of solid material added to the extractor. This includes any water used in transferring the solid material to the extractor.

(E) Begin agitation and adjust the pH of the solution to  $5.0 \pm 0.2$  using 0.5N acetic acid. Hold the pH at  $5.0 \pm 0.2$  and continue agitation for  $24 \pm 0.5$  hours. If more than 4 ml of acid for each gm of solid is required to hold the pH at 5, then once 4 ml of acid per gm has been added, complete the 24 hour extraction without adding any additional acid. Maintain the extractant at  $20-40^\circ\text{C}$  ( $68-104^\circ\text{F}$ ) during extraction. It is recommended that a device such as the Type 45-A pH Controller manufactured by Chemtrix, Inc., Hillsboro, OR 97123, or equivalent, be used for controlling pH. If such a device is not available then the following manual procedure can be employed.

MANUAL pH ADJUSTMENT

1. Calibrate pH meter in accordance with manufacturer's specifications.

2. Add 0.5N acetic acid and adjust pH of solution to  $5.0 \pm 0.2$ . If more than 4 ml of acid for each gm of solid is required to hold the pH at 5, then once 4 ml of acid per gm has been added, complete the 24 hour extraction without adding any additional acid. Maintain the extractant at  $20-40^\circ\text{C}$  ( $68-104^\circ\text{F}$ ) during extraction.

3. Manually adjust pH of solution at 15, 30, and 60 minute intervals moving to the next longer interval if the pH did not have to be adjusted more than 0.5 pH units since the previous adjustment.

4. Continue adjustment procedure for a period of not less than 6 hours.

5. Final pH after a 24 hour period must be within the range 4.9-5.2; unless 4 ml of acid per gram of solid has already been added.

6. If the conditions of 5 are not met, continue pH adjustment at approximately one hour intervals for a period of not less than 4 hours.

(F) At the end of the 24 hour extraction period, separate the material in the extractor into solid and liquid phases as in paragraph (A). Adjust the volume of the resulting liquid phase with deionized water so that its volume is 20 times that occupied by a quantity of water at  $4^\circ\text{C}$  equal in weight to the initial quantity of solid material charged to the extractor (e.g., for an initial weight of 1 gm, dilute to 20 ml). Combine this solution with the original liquid phase from paragraph (A). This combined liquid, and any precipitate which may later form, is the Extraction Procedure Extract.

(ii) *Analysis*—Analyses conducted to determine conformance with Section 250.13(b)(1) shall be made in accordance with the following or equivalent methods:

(A) *Arsenic*—Atomic Absorption Method, "Methods for Chemical Anal-

ysis of Water and Wastes," pp. 95-96, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(B) *Barium*—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," latest edition, or "Methods for Chemical Analysis of Water and Wastes," pp. 97-98, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(C) *Cadmium*—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," latest edition, or "Methods for Chemical Analysis of Water and Wastes," pp. 101-103, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(D) *Chromium*—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," latest edition, or "Methods for Chemical Analysis of Water and Wastes," pp. 112-113, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(E) *Lead*—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," latest edition, or "Methods for Chemical Analysis of Water and Wastes," pp. 112-113, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(F) *Mercury*—Flameless Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 118-126, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460.

(G) *Selenium*—Atomic Absorption Method, "Methods for Chemical analysis of Water and Wastes," p. 145, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(H) *Silver*—Atomic Absorption Method, "Standard Method for the Examination of Water and Wastewater," latest edition, or "Methods for Chemical Analysis of Water and Wastes," p. 146, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(I) *Endrin, Lindane, Methoxychlor, or Toxaphene*—as described in "Method for Organochlorine Pesticides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

(J) *2, 4-d and 2, 4, 5-TP Silver*—as described in "Methods for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," MDQARL, Environmental

Protection Agency, Cincinnati, Ohio, November 28, 1973.

§ 250.14 Hazardous waste lists.

A solid waste is a hazardous waste if it is listed in paragraphs (a) or (b) below unless it can be demonstrated, pursuant to the procedures under § 250.15, that the Administrator's basis for listing the waste does not meet the criteria for listing under § 250.12(b). The Administrator's basis for listing a waste in paragraphs (a) and (b) is identified by parenthetical codes that follow each listed waste. These codes reference the following bases for listing:

- I—Meets the criterion of § 250.12(b)(1) because the waste meets the ignitable characteristic of § 250.13(a)
- C—Meets the criterion of § 250.12(b)(1) because the waste meets the corrosive characteristic of § 250.13(b).
- R—Meets the criterion of § 250.12(b)(1) because the waste meets the reactive characteristic of § 250.13(c).
- T—Meets the criterion of § 250.12(b)(1) because the waste meets the toxic characteristic § 250.13(d).
- N—Meets the criterion of § 250.12(b)(2) because the waste contains infectious agents.
- A—Meets the criterion of § 250.12(b)(2) because the waste contains radioactive substances.
- M—Meets the criterion of § 250.12(b)(2) because the waste contains mutagenic, carcinogenic, or teratogenic substances.
- B—Meets the criterion of § 250.12(b)(2) because the waste contains substances that bioaccumulate.
- O—Meets the criterion of § 250.12(b)(2) because the waste contains toxic organic substances.

NOTE.—The process waste streams are listed by Standard Industrial Classification (SIC) codes for ease of reference only. The SIC classification of the industry generating the waste has no effect on the listing of that process waste as hazardous.

(a) Hazardous waste.

- Waste chlorinated hydrocarbons from degreasing operations (I,T,O)
- Waste non-halogenated solvent (such as methanol, acetone, isopropyl alcohol, polyvinyl alcohol, stoddard solvent and methyl ethyl ketone) and solvent sludges from cleaning, compounding milling and other processes (I,O)
- Waste lubricating oil (T,O)
- Waste Hydraulic or cutting oil (T,O)
- Paint wastes (such as used rags, slaps, latex sludge, spent solvent) (T,I,O)
- Water-based paint wastes (T)
- Tank bottoms, leached (T)
- Spent or waste cyanide solutions or sludges (R,T)
- Etching acid solution or sludges (T,C)
- Waste paint and varnish remover or stripper (I,O)
- Solvents and solvent recovery still bottoms (non-halogenated) (I,O)
- Solvents and solvent recovery still bottoms (halogenated) (O)
- Waste or waste off-spec toluene diisocyanate (I,R,O)
- Leachate from hazardous waste landfills (T,O,M,B.)

Electroplating wastewater treatment sludge (T)

Material which is within the scope of Section 250.10(b) and is normally shipped using a name listed in Appendix III (Pesticides), Appendix IV (DOT Poison A, Poison B, ORM-A Materials), or Appendix V (Priority Pollutants) (T,O,M)

Spill clean-up residues and debris from spills of materials which appear in Appendix III, IV, or V (T,O,M)

Off-specification material which is within the scope of Section 250.10(b) and, if met specification would be shipped using a name listed in Appendix III, IV, or V (T,O,M)

Containers, unless triple rinsed, which have contained materials normally shipped using a name listed in Appendix III, IV, or V (T,O,M)

(b) *Hazardous waste sources and processes.* (1) *Sources generating hazardous waste.* The following sources generate hazardous waste unless the waste from these sources does not contain microorganisms or helminths of CDC Classes 2 through 5 of the Etiologic Agents listed in Appendix VI of this Subpart.

(i) *Health care facilities.* (A) The following departments of hospitals as defined by SIC Codes 8062 and 8069, unless the waste has been treated as specified in Appendix VII of this Subpart. (N)

Obstetrics department including patients' rooms  
Emergency departments  
Surgery department including patients' rooms  
Morgue  
Pathology department  
Autopsy department  
Isolation rooms  
Laboratories  
Intensive care unit  
Pediatrics department

(B) The following departments of veterinary hospitals as defined by SIC Codes 0741 and 0742, unless the waste has been treated as specified in Appendix VII. (N)

Emergency department  
Surgery department including patients' rooms  
Morgue  
Pathology department  
Autopsy department  
Isolation rooms  
Laboratories  
Intensive care unit

(ii) Laboratories, as defined by SIC Codes 7391, 8071 and 8922, unless the laboratories do not work with CDC Classes 2 through 5 of Etiologic Agents as listed in Appendix VI. (N)

(iii) Sewage Treatment Plants, with the exception of publicly owned treatment works, unless sludge generated by such a plant has been stabilized by means of chemical, physical thermal, or biological treatment processes that result in the significant reduction of odors, volatile organics and pathogenic microorganisms. These processes are

discussed in "Municipal Sludge Management: Environmental Factors; Technical Bulletin" (42 FR 57420). Specifications for the stabilization processes discussed in this publication are given in *Process Design Manual for Sludge Treatment and Disposal*, (EPA 625/1-1-74/006, October 1974). (N)

(2) *Processes generating hazardous waste:*

SIC Process Description

1094 Waste rock and overburden from uranium mining (A)  
1099 Chlorinator residues and clarifier sludge from zirconium extraction (A)  
1475 Overburden and slimes from phosphate surface mining (A)  
2874 Waste gypsum from phosphoric acid production (A)  
2819-2874 Slag and fluid bed prills from elemental phosphorus production (A)  
2231 Wool fabric dyeing and finishing wastewater treatment sludges (T,O)  
2261-2 Woven fabric dyeing and finishing wastewater treatment sludges (Y,O)  
2250 Knit fabric dyeing and finishing wastewater treatment sludges (O,T)  
2269 Yarn and stock dyeing and finishing wastewater treatment sludges (O,T)  
2279 Carpet dyeing and finishing wastewater treatment sludges (O,T)  
2299 Wool scouring wastewater treatment sludges (T)  
2812 Mercury bearing sludges from brine treatment from mercury cell process in chlorine production (T)  
2812 Sodium calcium sludge from production of chlorine by Down Cell process (R)  
2812 Mercury bearing brine purification muds from mercury cell process in chlorine production (T)  
2812 Waste water treatment sludge from diaphragm cell process in production of chlorine (T)  
2812 Chlorinated hydrocarbon bearing wastes from diaphragm cell process in chlorine production (O,M)  
2816 Chromium bearing wastewater treatment sludge from production of chrome green pigment (T)  
2816 Chromium bearing wastewater treatment sludge and other chromium bearing wastes from production of chrome oxide green pigment (anhydrous & hydrated)  
2816 Ferric ferrocyanide bearing wastewater treatment sludges from the production of iron blue pigments (T)  
2816 Mercury bearing wastewater treatment sludges from the production of mercuric sulfide pigment (T)  
2816 Chromium bearing wastewater treatment sludges from the production of TiO<sub>2</sub> pigment by the chloride process (T)  
2816 Chromium bearing wastewater treatment sludges from the production of TiO<sub>2</sub> pigment by the sulfate process (T)  
2816 Arsenic bearing sludges from purification process in the production of antimony oxide (T)  
2816 Antimony bearing wastewater treatment sludge from production of antimony oxide (T)  
2816 Chromium or lead bearing wastewater treatment sludge from production of chrome yellows and oranges (lead chromate) (T)

2816 Chromium or lead bearing wastewater treatment sludge from production of molybdate orange (lead molybdate lead chromate) (T)

2816 Zinc and chromium bearing wastewater treatment sludge from production of zinc yellow pigment (hydrated zinc potassium chromate) (T)

2816 Ash from incinerated still bottoms (paint and pigment production) (T)

2819 Arsenic bearing wastewater treatment sludges from production of boric acid. (T)

2834 Arsenic or organo-arsenic containing wastewater treatment sludges from production or veterinary pharmaceuticals (T,M,O)

2851 Wastewater treatment sludges from paint production (C,T)

2851 Air pollution control sludges from paint production (T)

2865 Vacuum still bottoms from the production of maleic anhydride (O)

2865 Still bottoms from distillation of benzyl chloride (O)

2865 Distillation residues from fractionating tower for recovery of benzene and chlorobenzenes (O,B)

2865 Vacuum distillation residues from purification of 1-chloro-4-nitrobenzene (O,M)

2865 Still bottoms or heavy ends from methanol recovery in methyl methacrylate production (O)

2869 Heavy ends (still bottoms) from fractionator in production of epichlorohydrin (M,O)

2869 Heavy ends from fractionation in ethyl chloride production (M,O)

2869 Column bottoms or heavy ends from production of trichloroethylene (O,B)

2869 Residues from the production of hexachlorophenol, trichlorophenol and 2,4,5-T (O)

2869 Heavy ends from distillation of vinyl chloride in production of vinyl chloride from ethylene dichloride (O)

2869 Heavy ends from distillation of ethylene dichloride in vinyl chloride production (O)

2869 Heavy ends or distillation residues from carbon tetrachloride fractionation tower (B,O)

2869 Heavy ends from distillation of ethylene dichloride in ethylene dichloride production (O)

2869 Purification column wastes from production of nitrobenzene (O)

2869 Still bottoms from production of furfural (O)

2869 Spent catalyst from fluorocarbon production (T,O)

2869 Centrifuge residue from toluene dithiocyanate production (O)

2869 Lead slag from lead alkyl production (T)

2869 Stripping still tails from production of methyl ethyl pyridines (I,O)

2869 Still bottoms from aniline production (O)

2869 Aqueous effluent from scrubbing of spent acid in nitrobenzene production (O)

2869 Bottom stream from quench column in acrylonitrile production (O)

2869 Bottom stream from wastewater stripper in production of acrylonitrile (O)

2869 Still bottoms from final purification of acrylonitrile (O,M)

2869 Solid waste discharge from ion exchange column in production of acrylonitrile (O,M)

- 2869 Waste stream from purification of HCN in production of acrylonitrile (O,M)
- 2869 Waste stream (column bottoms) from acetonitrile purification in production of acrylonitrile (O)
- 2890 Sludges, wastes from tub washer (Ink Formulation) (T,C,O)
- 2869 Wastewater treatment, sludges from the production of dieldrin, chlordane, toxaphene, disulfoton, malathion, phorate, carbaryl, pentadiene, trifluralin, alachlor, methyl parathion, vernoloate, methomyl, carbofuran, captan, creosote, dithacarbamates, pentachlorophenol, bromacil, diuron, p-chlorobenzene and cloroxuron. (O,M,B)
- 2869 Wastewater from oxidation of aldrin solution in production of dieldrin. (O,M,B)
- 2869 Wastewater from extraction of dieldrin solution in production of dieldrin. (O,M,B)
- 2869 Wastewater and scrub water from chlorination of cyclopentadiene in production of chlordane. (O,M,B)
- 2869 Filter solids from filtration of hexachlorocyclopentadiene in production of chlordane. (O,M,B)
- 2869 Filter cake from filtration of toxaphene solution in production of toxaphene. (O,M,B)
- 2869 Unrecovered triester from production of disulfoton. (O,M)
- 2869 Still bottoms from toluene reclamation distillation in production of disulfoton. (O,M)
- 2869 Filter cakes from filtration of dimethylphosphorothion and DMTA in production of malathion. (O,M)
- 2869 Liquid wastes from washing and stripping in production of malathion. (O,M)
- 2869 Liquid and solid wastes from the washing, stripping and filtering of phorate in phorate production. (O,M)
- 2869 Filter cake from the filtration of diethylphosphorodithioric acid in the production of phorate. (O,M)
- 2869 Heavy ends and distillation residues from production of carbaryl. (O,M)
- 2869 2,6-D waste by-product from production of 2,4-D. (O,M,B)
- 2869 Heavy ends or distillation residues from distillation of tetrachlorobenzene in production of 2,4,5-T. (O,M,B)
- 2869 Scrubber and filter wastes from production of atrazine. (O,M)
- 2869 Filter cake from production of pyrethrin. (O)
- 2869 Filter cake from production of diazinon. (O,M)
- 2869 By-product salts in production of MSMA. (O)
- 2869 By-product salts in production of cacodylic acid. (T)
- 2869 Tars from manufacture of bicycloheptadiene and cyclopentadiene. (O,M,B)
- 2892 Wastewater treatment sludges from explosives, propellants and initiating compounds manufacture (C,T,R,I)
- 2892 Wastes recovered from acid vapor scrubber stream in the production of RDX/HMX (O,R,I)
- 2892 Catch basin materials in RDX/HMX production (C)
- 2892 Spent carbon columns used in treatment of wastewater-LAP operations (R)
- 2892 Wastewater treatment sludges from production of initiating compounds (T)
- 2892 Red water and pink water from TNT production (O)
- 2911 Petroleum refining, high octane production neutralization HF alkylation sludge (T,O,M)
- 2911 Petroleum refining DAF sludge (T, I, O)
- 2911 Petroleum refining kerosene filter cakes (T,O,M)
- 2911 Petroleum refining lube oil filtration clays (T,O,M)
- 2911 Petroleum refining—slop oil emulsion solids (T,I,O)
- 2911 Petroleum refining exchange bundle cleaning solvent (T,O)
- 2911 API separator sludge (T,O)
- 3111 Leather tanning and finishing: Wastewater treatment sludge from chrome tannery, beamhouse/tanhouse (T)
- 3111 Leather tanning and finishing: Wastewater treatment screenings from sheepskin tannery, split tannery and retan/finishers (T)
- 3111 Trimmings and shavings from leather tanning and finishing chrome, split, beam/tanhouse and retan/finishers (T)
- 3111 Wastewater treatment sludge from dehairing (R,T)
- 3312 Coking: Decanter tank tar (T,O)
  - : Decanter tank pitch sludge (T,O)
  - : Oleum wash waste (C)
  - : Caustic neutralization waste (C)
  - : Ammonia still lime sludge (T)
- 3312 Iron Making: Ferromanganese blast furnace dust (T,R)
  - : Ferromanganese blast furnace sludge (T)
  - : Electric furnace dust and sludge (T)
- 3312 Steel Finishing: Alkaline cleaning waste (C)
  - : Waste pickle liquor (C)
  - : Cyanide-bearing wastes from electrolytic coating (T)
  - : Chromate and dichromate wastes from chemical treatment (T)
  - : Descaling acid (T,C)
- 3331 Primary copper smelting and refining electric furnace slag, converter dust, acid plant sludge, and reverberatory dust (T)
- 3332 Primary lead blast furnace dust (T)
- 3332 Primary lead lagoon dredging from smelter (T)
- 3333 Zinc acid plant blowdown lime treatment: gypsum cake (acid cooling tower and neutral cooling tower) (T)
- 3333 Zinc production: oxide furnace residue and acid plant sludge (T)
- 3333 Zinc anode sludge (T)
- 3339 Primary antimony—electrolytic sludge (T)
- 3339 Primary tungsten—digestion residues (T)
- 3339 Primary lead sinter dust scrubbing sludge (T)
- 3339 Ferromanganese emissions control: baghouse dusts and scrubwater solids (T)
- 3339 Ferrochrome silicon furnace emission control dust or sludge (T)
- 3339 Ferrochrome emissions control: furnace baghouse dust, and ESP dust (T)
- 3339 Primary antimony—pyrometallurgical blast furnace slag (T)
- 3341 Secondary lead, scrubber sludge from SO<sub>2</sub> emission control, soft lead production (T)
- 3341 Secondary lead—white metal production furnace dust (T)
- 3341 Secondary copper—pyrometallurgical, blast furnace slag. (T)
- 3341 Secondary copper—electrolytic refining wastewater treatment sludge (T)
- 3341 Secondary aluminum dross smelting—high salt slag plant residue (T)
- 3341 Zinc—cadmium metal reclamation, cadmium plant residue. (T)
- 3691 Lead acid storage battery production wastewater treatment sludges (T)
- 3691 Lead acid storage battery production clean-up wastes from cathode and anode paste production (T)
- 3691 Nickel cadmium battery production wastewater treatment sludges (T)
- 3691 Cadmium silver oxide battery production wastewater treatment sludge (T)
- 3691 Mercury cadmium battery production wastewater treatment sludges (T)
- 3692 Magnesium carbon battery production chromic acid wastewater treatment sludges (T)

§ 250.15 Demonstration of non-inclusion in the hazardous waste system.

(a) Any person wishing to demonstrate to EPA that a solid waste from an individual facility, whose waste is listed in § 250.14 (a) or (b), is not a hazardous waste may do so by performing the tests described below on a representative sample of the waste for those characteristics or properties indicated by the codes (i.e., (I), (C), (R), (N), (T), (A), (O), (M), (B)) following the waste listing. A certification of the test results shall be submitted to the EPA Administrator by certified mail with return receipt requested. The results of the tests must show the waste is non-hazardous for each characteristic or property indicated.

(1) Waste designated as ignitable (I) must be shown by the § 250.13(a) ignitable characteristic method not to meet the § 250.13(a) definition.

(2) Waste designated as corrosive (C) must be shown by the § 250.13(b) corrosive characteristic method not to meet the § 250.13 (b) definition.

(3) Waste designated as reactive (R) must be shown by the § 250.13(c) reactive characteristic method not to meet the § 250.13 (c) definition.

(4) Waste designated as toxic (T) must be shown by the § 250.13(d) toxic characteristic method not to meet the § 250.13(d) definition.

(5) Waste designated as radioactive (A) must be shown to have either of the following properties:

(i) An average radium-226 concentration less than 5 picocuries per gram for solid waste or 50 picocuries (radium-226 and radium-228 combined) per liter for liquid waste as determined by either of the methods cited in Appendix VIII of this Subpart; or

(ii) A total radium-226 activity less than 10 microcuries for any single discrete source.

(6) Waste designated as mutagenic (M), bioaccumulative (B), or toxic organic (O) must be shown to have an Extraction Procedure extract (see

§ 250.13(d)(2) with none of the following properties:

(i) *Mutagenic (M)*: Contains more than one mg/liter of any compound on the Controlled Substances List in Appendix IX of this Subpart or gives a positive response in any one of a set of required tests for mutagenic activity. A total of three assays must be conducted. One shall be chosen from group I, one from group II, and one from those listed in group III. Test protocols are defined in Appendix X of this Subpart.

Group I Detection of gene mutations

1. Point mutation in bacteria

Group II Detection of gene mutations

1. Mammalian somatic cells in culture.

2. Fungal microorganisms.

Group III Detecting effects of DNA repair or recombination as an indication of genetic damage

1. DNA repair in bacteria (including differential killing of repair defective strains).

2. Unscheduled DNA synthesis in human diploid cells.

3. Sister-chromatid exchange in mammalian cells.

4. Mitotic recombination and/or gene conversion in yeast.

(ii) *Bioaccumulative (B)*: Gives a positive result in the Bioaccumulation Potential Test, defined in Appendix XI of this Subpart.

(iii) *Toxic Organic (O)*: Contains any organic substance which has a calculated human LD50\* of less than 800 mg/kg, at a concentration in mg/l greater than or equal to 0.35 times its LD50 expressed in units of mg/kg. For purposes of this Subpart, metallic salts of organic acids containing 3 or fewer carbon atoms are considered not to be organic substances.

\* Procedure for Calculating Human LD50 Value:

The LD50 value to be used will be that for oral exposure to rats. Where a value for the rat is not available, mouse oral LD50 data may be employed. Where an appropriate LD50 value for the rat or mouse is listed in the NIOSH Registry of Toxic Effects of Chemical Substances ("Registry"), this value may be used without validation. If other values are used, they must be supported by specific and verified laboratory reports. The appropriate conversion factors to use in calculating LD50s are:

Rat x.16 = human

Mouse x.066 = human

Example: Tetraethylenepentamine

Listed oral rat LD50 is 3990 mg/kg calculated human LD50 is  $3990 \times 0.16 = 638$  mg/kg;  $638 \times 0.35 = 223$  mg/l

Thus if the EP extract contains more than 223 mg/l of tetraethylenepentamine the waste is hazardous.

(b) A person desiring to demonstrate that solid waste from an individual facility is not hazardous may perform the tests himself or have an appropriate laboratory facility perform them.

(c) The certification of the test results shall contain the following information:

(1) *General information.* (i) The name, address and identification number of person desiring the demonstration.

(ii) The name and address of the laboratory facility performing the sampling and/or tests if different from that of the person desiring demonstration.

(iii) The name(s) and qualification(s) of the person(s) sampling the waste.

(iv) The name(s) and qualification(s) of the person(s) testing the waste.

(v) The date(s) of the sampling of the waste.

(vi) The date(s) of the testing of the waste.

(vii) The quantity of waste generated or handled per month.

(2) *Waste sampling.* (i) A description of the methodology used to obtain the representative sample.

(ii) A description of sample handling techniques (e.g., sample splitting, extraction, containerization, preservation, etc.).

(iii) A description of the equipment used in obtaining or handling the sample.

(3) *Waste testing.* (i) A description of the test(s) performed (e.g., Extraction Procedure, flash point, etc.).

(ii) The results of each test performed.

(iii) The names and model numbers of the instruments used in performing the tests.

(iv) A statement as to whether there are or will be any significant changes in the person's feed materials or operations which may alter the results of any of the tests performed.

(v) A copy of any documents indicating results of any of the tests.

(4) *Certification/signature.* The following statement signed by the person desiring demonstration, and by the supervisors of all persons who participated in the sampling and testing of the waste:

I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submit-

ting false information, including the possibility of fine and imprisonment.

(d) If a person submits a demonstration under paragraph (a) of this section, that demonstration shall take effect 90 days after the receipt by the Administrator of the demonstration, except that it shall cease to be effective at any time the Administrator disapproves the demonstration. During the time that a demonstration is in effect, persons otherwise covered are not subject to Subparts B, C, D and E with respect to waste included in the demonstration.

(e) The Administrator may disapprove a demonstration submitted under this section for good cause and for the following reasons:

(1) The procedures prescribed in paragraphs (a) (1)-(a) (6) were not followed:

(2) The results of the demonstration do not show that the solid waste fails to meet the criteria for listing under § 250.12(b);

(3) The results of the demonstration are based on fraudulently derived or inaccurate information

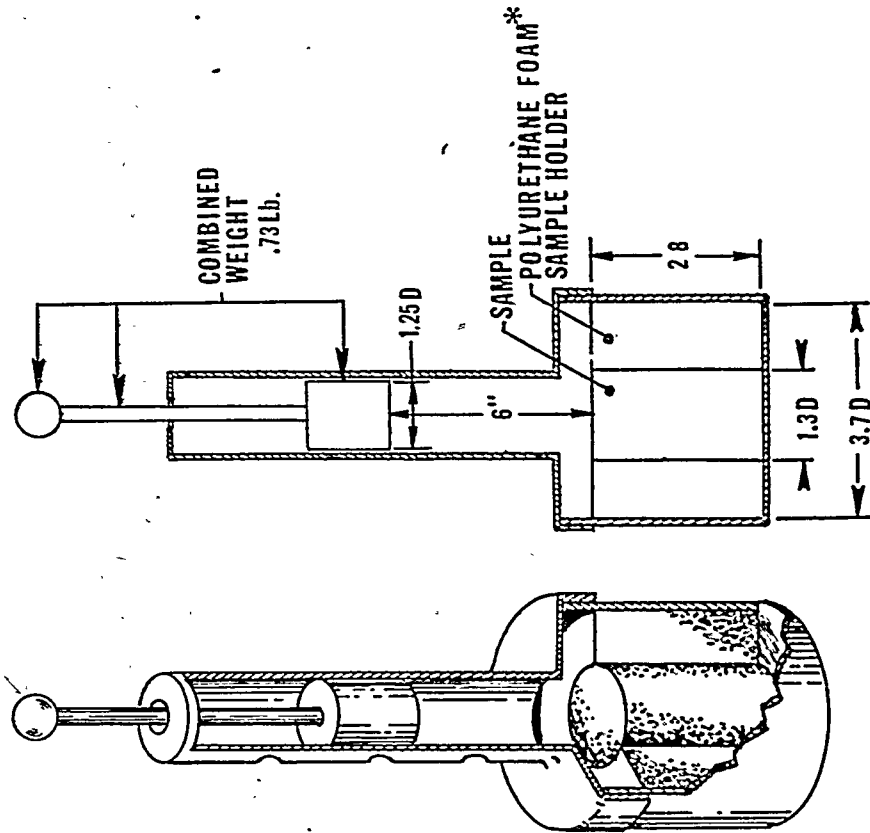
(4) There is insufficient information; or on which to make a determination.

(f) Where the Administrator disapproves a demonstration, the party who submitted it may request that a public hearing be held. If a demonstration is approved, an interested party who can show that he is aggrieved by such an action may request a hearing. The Administrator may grant the request for a hearing if there are genuine and relevant factual issues that may be resolved in such a hearing. Each hearing shall be preceded by adequate public notice, shall be informal rather than a formal adjudication and shall be presided over by the Administrator or some person to whom he delegates that responsibility.

(g) The decisions of the presiding officer at a hearing held under paragraph (f) shall constitute final Agency action, and are not appealable to the Administrator.

(h) While a request for a hearing is pending, the decision which is being appealed shall be considered effective, except that at his discretion the Administrator may grant a request for a stay of the effectiveness, pending the outcome of the hearing.

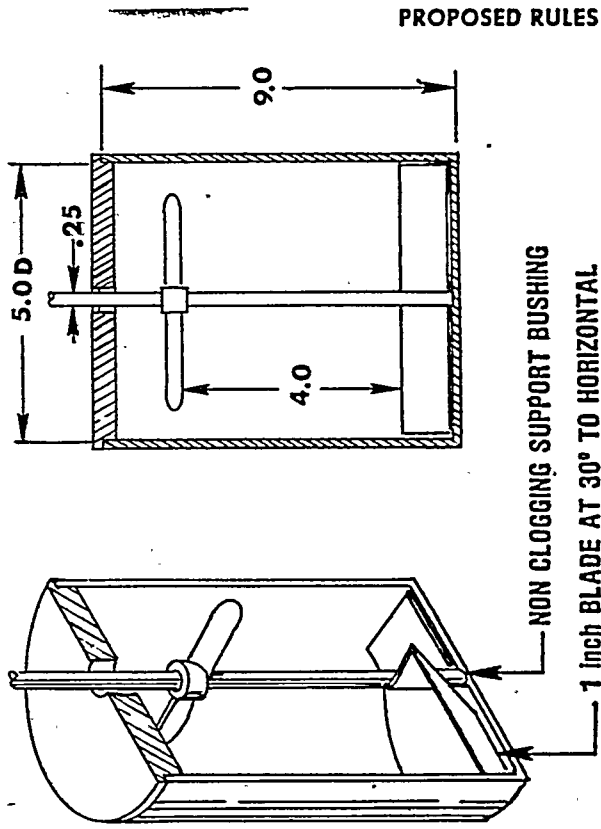
Figure 1



**COMPACTION TESTER**

\* Polyurethane foam shall conform to requirements for Grade 21, performance Grade AD or BD, established in ASTM Standard D3453.

Figure 2



**EXTRACTOR**



## APPENDIX I—SAMPLING METHODS

The methods and equipment used for sampling waste materials will vary with the form and consistency of the waste material to be sampled. Listed below are sampling protocols appropriate for sampling waste materials with consistencies similar to the indicated material.

Extremely viscous liquid—ASTM Standard D140-70

Crushed or powdered material—ASTM Standard D346-75

Soil or rock-like material—ASTM Standard D420-69

Soil-like material—ASTM Standard D1452-65

Fly ash-like material—ASTM Standard D2234-76

Additional protocols to be used are described in the draft report "Handbook for Sampling Hazardous Waste", Research Grant R-804692010, available from USEPA, Office of Solid Waste, Information-Materials Group, Cincinnati, Ohio 452168.

## APPENDIX II—EXPLOSION TEMPERATURE TEST

1. *Purpose of Test:* To determine whether a material explodes, ignites, or decomposes after a five second immersion in a sand bath or low flammability liquid (such as high molecular weight silicone oil) at temperatures up to 125°C and if so, at what temperature.

2. *Operating Principle:* This test gives an estimate of how close the explosion temperature is to ambient condition for a material, and, hence, provides a measurable indication of thermal instability.

3. *Test Description:* The material to be tested (25 mg.) is placed in a copper test tube (high thermal conductivity) and immersed in the controlled temperature bath. This test is made at a series of bath temperatures, and the time lag prior to explosion at each temperature is recorded (up to 10 min.). The bath temperature is raised until a temperature of 125°C is reached if no explosion, ignition, or apparent decomposition occurs.

NOTE.—This is a modification of the test taken from H. Henkin, and R. G. McGill, Industrial & Engr. Chem. V44 p135.

## APPENDIX III—SELECTED CANCELLED AND RPAR PESTICIDES

NOTE.—(The following listing contains those cancelled and RPAR pesticides not covered by the characteristics and not listed elsewhere in this Subpart).

Aramite  
BAAM  
Benomyl  
Benzac  
Chloranil  
Chlorobenzilate  
DBCP  
Diallate  
Dimethoate  
EBDC  
Kepone  
Maleic Hydrazide  
Mirex  
Monuron  
OMPA  
PCNB  
Phenazine Chloride  
Polychlorinated Terphenyls  
Pronamide  
Strobane  
2,4,5-T  
1080/1081

Thiophonate Methyl  
Trysben

## APPENDIX IV—SELECTED DEPARTMENT OF TRANSPORTATION (DOT) CLASSIFICATION POISON A, POISON B, AND ORM-A SUBSTANCES (FROM 49 CFR 172.101)

NOTE.—The following list contains substances not covered by the characteristics and not listed elsewhere in this Subpart. Those items marked \* are not regulated unless the commodity meets the DOT definition of the hazard class listed.

\* n.o.s.—not otherwise specified.

acetaldehyde ammonia	ORM-A	grenade without bursting charge: with	B
acetone cyanohydrin	B	Polson B charge.	
acetylene tetrabromide	ORM-A	hexachloroethane	ORM-A
allethrin	ORM-A	hexaethyl tetraphosphate and compressed gas mixture.	A
ammonium hydrosulfide solution	ORM-A	hexaethyl tetraphosphate, liquid	B
ammonium polysulfide solution	ORM-A	hexaethyl tetraphosphate mixture, dry (containing more than 2% hexaethyl tetraphosphate).	B
aniline oil drum	B	* hexaethyl tetraphosphate mixture, dry (containing not more than 2% hexaethyl tetraphosphate).	B
aniline oil, liquid	B	hexaethyl tetraphosphate mixture, liquid (containing more than 25% hexaethyl tetraphosphate).	B
antimony lactate, solid	ORM-A	* hexaethyl tetraphosphate mixture, liquid (containing not more than 25% hexaethyl tetraphosphate).	B
antimony potassium tartrate, solid	ORM-A	hydrocyanic acid, liquified	A
antimony sulfide, solid	ORM-A	hydrocyanic acid (prussic), solution (5% or more hydrocyanic acid).	A
barium cyanide, solid	B	hydrocyanic acid solution, less than 5% hydrocyanic acid.	B
* beryllium compound, n.o.s.	B	* insecticide, dry, n.o.s.	B
bone oil	ORM-A	insecticide, liquified gas, containing Poison A material or Poison B material.	A
bromoacetone	A	* insecticide, liquid, n.o.s.	B
brucine, solid (dimethoxy strychnine)	B	London purple, solid	B
calcium cyanide, solid, or	B	Malathion	ORM-A
calcium cyanide mixture, solid	B	* medicines, n.o.s., liquid	B
camphene	ORM-A	* medicines, n.o.s., solid	B
carbaryl	ORM-A	* mercaptan mixture, aliphatic (in containers of 110 gallons or less).	ORM-A
carboric acid, liquid or phenol; liquid (liquid tar acid containing over 50% benzophenol).	B	methyl bromide and ethylene dibromide mixture, liquid.	B
carboric acid, or phenol	B	methyl bromide and more than 2% chloropicrin mixture, liquid.	B
carbon tetrachloride	ORM-A	methyl bromide and nonflammable, nonliquified compressed gas mixture, liquid (including up to 2% chloropicrin).	B
chemical ammunition, nonexplosive (containing a Poison B material).	B	methyl bromide, liquid (bromoethane) including up to 2% chloropicrin.	B
chemical ammunition, nonexplosive (containing a Poison A material).	A	methyl chloroform	ORM-A
chloroform	ORM-A	methyl parathion, liquid	B
4-chloro-o-toluidine hydrochloride	B	* methyl parathion mixture, dry	B
chloropicrin, absorbed	B	* methyl parathion mixture, liquid (containing 25% or less methyl parathion).	B
chloropicrin and methyl chloride mixture.	A	methyl parathion mixture, liquid, (containing over 25% methyl parathion).	B
chloropicrin, liquid	B	Mipafox	ORM-A
chloropicrin mixture (containing no compressed gas or Poison A liquid).	B	Motor fuel antiknock compound, or antiknock compound.	B
cocculus, solid (fishberry)	B	naphthalene or naphthalin	ORM-A
* compound, tree or weed killing, liquid	B	nickel cyanide, solid	B
copper cyanide	B	nicotine hydrochloride	B
* cyanide or cyanide mixture, dry	B	nicotine, liquid	B
cyanogen bromide	B	nicotine salicylate	B
cyanogen chloride (containing less than 0.9% water).	A	* nicotine sulfate, liquid	B
DDT	ORM-A	nicotine sulfate, solid	B
diazinon	ORM-A	nicotine tartrate	B
dibromodifluoromethane	ORM-A	nitric oxide	A
dichlorobenzene, ortho, liquid	ORM-A	nitroaniline	B
Dichlorobenzene, para, solid	ORM-A	nitrobenzol, liquid (oil or mirbane, nitrobenzene).	B
dichlorodifluoroethylene	ORM-A	nitrochlorobenzene, ortho, liquid	B
dichloromethane or methylene chloride	ORM-A	nitrochlorobenzene, meta or para, solid	B
2,4 dichlorophenoxyacetic acid	ORM-A	nitrogen dioxide, liquid	A
dieldrin	ORM-A	nitrogen peroxide, liquid	A
dinitrobenzene, solid or dinitrobenzol, solid.	B	nitrogen tetraoxide, liquid	A
* dinitrobenzene solution	B	nitroxylol	B
dinitrochlorobenzol, solid or	B	* organic phosphate, organic phosphate compound; mixed with compressed gas.	A
dinitrochlorobenzene.		* organic phosphate, organic phosphate compound; mixed with compressed gas, compound; or organic phosphorus compound; liquid.	B
dinitrocyclohexylphenol	ORM-A	* organic phosphate, organic phosphate compound; or organic phosphorus, compound; solid or dry.	B
* dinitrophenol solution	B	* organic phosphate mixture, organic phosphate compound mixture, or organic phosphorus compound mixture, liquid.	B
* disinfectant, liquid	B	* organic phosphate mixture, organic phosphate compound mixture, or organic phosphorus compound mixture, liquid.	B
* disinfectant, solid	B	* organic phosphate mixture, organic phosphate compound mixture, or organic phosphorus compound mixture, liquid.	B
* drugs, n.o.s., liquid	B	* organic phosphate mixture, organic phosphate compound mixture, or organic phosphorus compound mixture, solid or dry.	B
* drugs, n.o.s., solid	B	parathion and compressed gas mixture	A
ethylene chlorohydrin	B	parathion, liquid	B
ethylene dibromide (1, 2-dibromomethane).	ORM-A		
ferrophosphorus	ORM-A		
flue dust, poisonous	B		
formaldehyde, or formalin solution (in containers of 110 gallons or less).	ORM-A		
germane	A		
grenade without bursting charge: with Poison A gas charge.	A		

* parathion mixture, dry	B
parathion mixture, liquid	B
perchloro-methyl-mercaptan	B
perfluoro-2-butene	ORM-A
phencapton	ORM-A
phenyl dichloro arsine	B
phenylenediamine, meta or para, solid	ORM-A
phosgene (diphosgene)	A
phosphine	A
poisonous liquid, n.o.s. or poison B, liquid, n.o.s.	B
poisonous liquid or gas, n.o.s.	A
poisonous solid, n.o.s., or poison B, solid, n.o.s.	B
potassium cyanide, solid	B
* potassium cyanide solution	B
silver cyanide	B
sodium azide	B
sodium cyanide, solid	B
* sodium cyanide, solution	B
sodium dichromate	ORM-A
sodium pentachlorophenate	ORM-A
strontium arsenite, solid	B
* strychnine salt, solid	B
strychnine, solid	B
tetrachloroethane	ORM-A
tetrachloroethylene or perchloroethylene	ORM-A
tetraethyl dithio pyrophosphate and compressed gas mixture	A
tetraethyl dithio pyrophosphate, liquid	B
tetraethyl dithio pyrophosphate, mixture, dry	B
tetraethyl dithio pyrophosphate, mixture liquid	B
tetraethyl lead, liquid (including flash point for export shipment by water)	B
tetraethyl pyrophosphate and compressed gas mixture	A
tetraethyl pyrophosphate, liquid	B
tetraethyl pyrophosphate, mixture, dry	B
tetraethyl pyrophosphate, mixture, liquid	B
tetramethyl methylene diamine	ORM-A
* thallium salt, solid n.o.s.	B
thallium sulfate, solid	B
thiophosgene	B
thiram	ORM-A
toluenediamine	ORM-A
trichloroethylene	ORM-A
zinc cyanide	B

APPENDIX V—SELECTED PRIORITY POLLUTANTS

NOTE.—The following list contains those priority pollutants not covered by the characteristics and not listed elsewhere in this Subpart.

Compound Name

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidine
6. chlorobenzene
7. 1,2,4-trichlorobenzene
8. hexachlorobenzene
9. 1,2-dichloroethane
10. 1,1,1-trichloroethane
11. 1,1-dichloroethane
12. 1,1,2-trichloroethane
13. chloroethane
14. bis(chloromethyl) ether
15. bis(2-chloroethyl) ether
16. 2-chloroethyl vinyl ether (mixed)
17. 2-chloronaphthalene
18. 2,4,6-trichlorophenol
19. parachloro-m-cresol
20. 2-chlorophenol
21. 1,3-dichlorobenzene
22. 3,3'-dichlorobenzidine
23. 1,1-dichloroethylene
24. 1,2-trans-dichloroethylene
25. 2,4-dichlorophenol
26. 1,2-dichloropropane
27. 1,2-dichloropropylene (1,3-dichloropropene)

28. 2,4-dimethylphenol
29. 2,4-dinitrotoluene
30. 2,6-dinitrotoluene
31. 1,2-diphenylhydrazine
32. ethylbenzene
33. fluoranthene
34. 4-chlorophenyl phenyl ether
35. 4-bromophenyl phenyl ether
36. bis (2-chloroisopropyl) ether
37. bis (2-chloroethoxy) methane
38. methyl chloride (chloromethane)
39. bromoform (tribromomethane)
40. dichlorobromomethane
41. trichlorofluoromethane
42. dichlorodifluoromethane
43. chlorodibromomethane
44. hexachlorobutadiene
45. hexachlorocyclopentadiene
46. isophorone
47. 2-nitrophenol
48. 4-nitrophenol
49. 4,6-dinitro-o-cresol
50. N-nitrosodimethylamine
51. N-nitrosodiphenylamine
52. N-nitrosodi-n-propylamine
53. pentachlorophenol
54. bis(2-ethylhexyl)phthalate
55. butyl benzyl phthalate
56. di-n-butyl phthalate
57. di-n-octyl phthalate
58. diethyl phthalate
59. dimethyl phthalate
60. benzo(a)anthracene (1,2-benzanthracene)
61. benzo(a)pyrene (3,4-benzopyrene)
62. 3,4-benzofluoranthene
63. benzo(k)fluoranthene (11,12-benzofluoranthene)
64. chrysene
65. acenaphthylene
66. anthracene
67. benzo(g,h,i)perylene (1,12-benzoperylene)
68. fluorene
69. phenanthrene
70. dibenzo(a,h)anthracene (1,2,5,6-dibenzanthracene)
71. indeno(1,2,3-c,d)pyrene (2,3-o-phenyleneperylene)
72. pyrene
73. toluene
74. vinyl chloride (chloroethylene)
75. aldrin
76. chlordane (technical mixture & metabolites)
77. a-endosulfan-Alpha
78. b-endosulfan-Beta
79. endosulfan sulfate
80. endrin aldehyde
81. heptachlor
82. heptachlor epoxide
83. a-BHC-Alpha
84. b-BHC-Beta
85. g-BHC-Delta
86. PCB-1242 (Arochlor 1242)
87. PCB-1254 (Arochlor 1254)
88. PCB-1221 (Arochlor 1221)
89. PCB-1232 (Arochlor 1232)
90. PCB-1248 (Arochlor 1248)
91. PCB-1260 (Arochlor 1260)
92. PCB-1016 (Arochlor 1016)
93. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

APPENDIX VI—CENTER FOR DISEASE CONTROL (CDC) CLASSIFICATION OF ETIOLOGIC AGENTS

The CDC Classification of Etiologic Agents on the Basis of Hazard includes the following classes of agents which are of potential hazard:

Class 2

Agents of ordinary potential hazard. This class includes agents which may produce disease of varying degrees of severity from accidental inoculation or injection or other means of cutaneous penetration but which are contained by ordinary laboratory techniques.

Class 3

Agents involving special hazard or agents derived from outside the United States which require a federal permit for importation unless they are specified for higher classification. This class includes pathogens which require special conditions for containment.

Class 4

Agents that require the most stringent conditions for their containment because they are extremely hazardous to laboratory personnel or may cause serious epidemic disease. This class includes Class 3 agents from outside the United States when they are employed in entomological experiments or when other entomological experiments are conducted in the same laboratory area.

Class 5

Foreign animal pathogens that are excluded from the United States by law or whose entry is restricted by USDA administrative policy.

These agents are specified as follows:

A. CLASSIFICATION OF BACTERIAL AGENTS

Class 2

- Actinobacillus—all species except *A. mallei* which is in class 3
- Arizona *hinsawii*—all serotypes
- Bacillus anthracis
- Bordetella—all species
- Borrelia recurrentis, B. vincenti
- Clostridium botulinum,
  - CL chauvoei, CL haemolyticum,
  - CL histolyticum, CL navyi,
  - CL septicum, CL tetani
- Corynebacterium diphtheriae, C. equi, C. renale
- Diplococcus (streptococcus) pneumoniae
- Erysipelothrix insidiosus
- Escherichia coli—all enteropathogenic serotypes
- Haemophilus ducreyi, H. influenzae
- Herellea vaginocola
- Klebsiella—all species and all serotypes
- Listeria—all species
- Mitina polymorpha
- Moraxella—all species
- Mycobacteria—all species except those listed in Class 3
- Mycoplasma—all species except Mycoplasma mycoides and mycoplasma agalactiae, which are in class 5
- Neisseria gonorrhoeae, N. meningitidis
- Pasteurella—all species except those listed in Class 3
- Salmonella—all species and all serotypes
- Shigella—all species and all serotypes
- Sphacrophorus necrophorus
- Staphylococcus aureus
- Streptobacillus moniliformis
- Streptococcus pyogenes
- Treponema carateum, T. pallidum, and T. pertenue
- Vibrio fetus, V. comma, including biotype EI Tor, and V. parahemolyticus



## Class 3

*Actinobacillus mallei*  
*Bartonella*—all species  
*Brucella*—all species  
*Francisella tularensis*  
*Mycobacterium avium*, *M. bovis*, *M. tuberculosis*  
*Pasteurella multocida* type B ("buffalo" and other foreign virulent strains)  
*Pseudomonas pseudomallei*  
*Yersenia pestis*

## B. CLASSIFICATION OF FUNGAL AGENTS

## Class 2

*Actinomycetes* (including *Nocardia* species and *Actinomyces* species and *Arachnia propionica*)  
*Blastomyces dermatitidis*  
*Cryptococcus neoformans*  
*Paracoccidioides brasiliensis*

## Class 3

*Coccidioides immitis*  
*Histoplasma capsulatum*  
*Histoplasma capsulatum* var. *duboisii*

## C. CLASSIFICATION OF PARASITIC AGENTS

## Class 2

*Endamoeba histolytica*  
*Leishmania* sp.  
*Naegleria gruberi*  
*Toxoplasma gondii*  
*Toxocara canis*  
*Trichinella spiralis*  
*Trypanosoma cruzi*

## Class 3

*Schistosoma mansoni*

## D. CLASSIFICATION OF VIRAL, RICKETTSIAL, AND CHLAMYDIAL AGENTS.

## Class 2

*Adenoviruses*—human—all types  
*Catch Valley virus*  
*Coxsackie A and B Viruses*  
*Cytomegaloviruses*  
*Encephalomyocarditis virus (EMC)*  
*Flanders Virus*  
*Hart Park Virus*  
*Hepatitis-associated antigen material*  
*Herpes Viruses*—except *Herpesvirus simiae* (Monkey B virus) which is in class 4  
*Corona viruses*  
*Influenza viruses*—all types except A/PR8/34, which is in class 1  
*Langat virus*  
*Lymphogranuloma venereum agent*  
*Measles virus*  
*Mumps virus*  
*Parainfluenza viruses*—all types except Parainfluenza virus 3, SF4 strain, which is in Class 1  
*Polioviruses*—all types, wild and attenuated  
*Poxviruses*—all types except *Alastrim*, *smallpox*, *Monkey pox*, and *whitepox*, which depending on experiments, are in Class 3 or Class 4.  
*Rabies virus*—all strains except *Rabies street virus*, which should be classified in Class 3 when inoculated into carnivores  
*Reoviruses*—all types  
*Respiratory syncytial virus*  
*Rhinoviruses*—all types  
*Rubella virus*  
*Similar viruses*—all types except *Herpesvirus simiae* (Monkey B virus) and *Marburg virus*, which are in Class 4  
*Sindbis virus*  
*Tensaw virus*

*Turlock virus*  
*Vaccinia virus*  
*Varicella virus*  
*Vole rickettsia*  
*Yellow fever virus*, 17D vaccine strain

## Class 3

*Alastrim*, *Smallpox*, *Monkey pox*, and *Whitepox*, when used *in vitro*  
*Arboviruses*—all strains except those in Class 2 and 4 (Arboviruses indigenous to the United States are in Class 3, except those listed in Class 2. *West Nile* and *Semliki Forest viruses* may be classified up or down, depending on the conditions or use and geographical location of the laboratory.)  
*Dengue virus*, when used for transmission or animal inoculation experiments  
*Lymphocytic choriomeningitis virus (LCM)*  
*Psittacosis-Ornithosis-Trachoma* group of agents  
*Rabies street virus*, when used in inoculations of carnivores (See Class 2)  
*Rickettsia*—all species except *Vole rickettsia* when used for transmission or animal inoculation experiments  
*Vesicular stomatitis virus*  
*Yellow fever virus*—wild, when used *in vitro*

## Class 4

*Alastrim*, *Smallpox*, *Monkey pox* and *Whitepox*, when used for transmission or animal inoculation experiments  
*Hemorrhagic fever agents*, including *Cri-mean hemorrhagic fever (Congo)*, *Junin*, and *Machupo viruses*, and others as yet undefined  
*Herpesvirus simiae* (Monkey B virus)  
*Lassa virus*  
*Marburg virus*  
*Tick-borne encephalitis virus complex*, including *Russian spring-summer encephalitis*, *Kyasanur forest disease*, *Omsk hemorrhagic fever*, and *Central European encephalitis viruses*  
*Venezuelan equine encephalitis virus*, epidemic strains, when used for transmission or animal inoculation experiments  
*Yellow fever virus*—wild, when used for transmission or animal inoculation experiments

## Class 5

A. Animal agents excluded from the United States by law.  
 Virus of foot and mouth disease  
 B. Animal agents excluded by USDA administrative policy.  
*African horse sickness virus*  
*African swine fever virus*  
*Besnoitia besnoiti*  
*Borna disease virus*  
*Bovine infectious petechial fever*  
*Camel pox virus*  
*Ephemeral fever virus*  
*Fowl plague virus*  
*Goat pox virus*  
*Hog cholera virus*  
*Louping ill virus*  
*Lumpy skin disease virus*  
*Nairobi sheep disease virus*  
*Newcastle disease virus (Asiatic strains)*  
*Mycoplasma mycoides* (contagious bovine pleuro-pneumonia)  
*Mycoplasma agalactiae* (contagious agalactia of sheep)  
*Rickettsia ruminatum* (heart water)  
*Rift valley fever virus*

*Sheep pox virus*  
*Swine vesicular disease virus*  
*Teschen disease virus*  
*Trypanosoma vivax* (Nagana)  
*Theileria parva* (East Coast fever)  
*Theileria annulata*  
*Theileria lawrenci*  
*Theileria bovis*  
*Theileria hirci*  
*Vesicular exanthema virus*  
*Wesselsbron disease virus*  
*Zyonaema farciminosum* (pseudofarcy)

## APPENDIX VII—INFECTIOUS WASTE TREATMENT SPECIFICATIONS

Infectious waste from departments of health care facilities as defined in § 250.14(b)(1) may be rendered non-hazardous by subjecting the waste to the following autoclave temperatures and dwell times:

## Steam Autoclave

- (1) Trash: 250 F (121 C) for 1 hour with 15 minutes prevacuum of 27 in. Hg.
- (2) Glassware: 250 F (121 C) for 1 hour with 15 minutes prevacuum of 27 in. Hg. for filled NIH Glassware can.
- (3) Liquids: 250 F (121 C) for 1 hour for each gallon.
- (4) Animals: 250 F (121 C) for 8 hours with 15 minutes prevacuum of 27 in. Hg.
- (5) Animal Bedding: 250 F (121 C) for 8 hours with 15 minutes prevacuum of 27 in. Hg.

or equivalent treatment methods such as gas sterilization or pathological incineration. Temperatures and dwell time will vary in relation to the volume of material, moisture content and other factors.

## APPENDIX VIII—RADIOACTIVE WASTE MEASUREMENTS

Radium-226 concentration can be determined by either of the following methods, referenced in Part 300 of *Standard Methods for the Examination of Water and Wastewater*, 13th ed. APHA, AWWA, WPCF, New York (1970).

1. Precipitation method
2. Radon Emanation Technique  
 Radium-226 concentration in liquid sources can be determined by the method referenced in *Interim Radiochemical Methodology for Drinking Water* (EPA-600/4-75-008 (Revised))

Additional Information Concerning Sample Preparation

1. *Radioassay Procedures for Environmental Samples* U.S. Department of Health, Education & Welfare, Public Health Service, Rockville, MD. (1967)
2. *Method for Determination of Radium-226 in Solid Waste Samples* available from USEPA Office of Solid Waste.

## APPENDIX IX—CONTROLLED SUBSTANCE LIST

NOTE.—Compounds and classes which have been reported to either mutagenic, carcinogenic, or teratogenic and which would not give a positive indication of activity using the prescribed tests. Where a class of compounds is listed, inclusion on this list does not mean that all members of the class have been shown to be either mutagenic, carcinogenic, or teratogenic. Demonstration that specific class members contained in the waste have not been shown to be either mutagenic, carcinogenic, or teratogenic, will be sufficient for a demonstration of non-hazard by reason of mutagenic activity (M).

Aloperidin  
 Amantadine  
 4-Aminoantipyrin acetamide  
 Aminopterin  
 3-Amino-1,2,4-triazole  
 6-Azauridine  
 Azo dyes  
 Benzene  
 Bisulfan  
 Carbon tetrachloride  
 Chloroquine  
 Chlorambucil  
 Cobalt salts  
 Colchicine  
 Coumarin derivatives  
 Cycasin  
 Cyclophosphamide  
 Dextroamphetamine sulfate  
 Diazepam (Valium)  
 Diethylstilbesterol  
 Dimethylaminoazobenzene  
 Dimethylnitrosamine  
 Diphenylhydantoin  
 Ethionine  
 Griseofulvin  
 1-Hydroxysafrole  
 Maleic Hydrazide  
 Methotrexate  
 Methylthiouracil  
 Mytomycin-C  
 d-Penicillamine  
 Phenylalanine  
 Phorbol esters  
 Quinine  
 Resperine  
 p-Rosanilin  
 Safrole  
 Serotonin  
 Streptomycin  
 Testosterone  
 Thioacetamide thiourea  
 Trimethadione  
 d-Tubocurarine

#### APPENDIX X—MUTAGENIC ACTIVITY DETECTION

##### GROUP I—DETECTION OF GENE MUTATIONS

###### a. Point Mutations in Bacteria

1. *Positive Controls:* All essays must be run with a concurrent positive control. Positive control compounds or mixtures shall be selected to demonstrate both the sensitivity of the indicator organism and the functioning of the metabolic activation system.

2. *Negative controls:* A solvent negative control shall be included.

3. *Choice of Organisms:* The bacteria used shall include strains capable of detecting base pair substitutions (both transitions and transversions) and frame-shift mutations. The known spectrum of chemical mutagens capable of being detected by the strains shall be considered when selecting the strains. The strains shall also be highly sensitive to a wide range of chemical mutagens. They may include strains whose cell wall, DNA repair, or other capabilities have been altered to increase sensitivity (Ames, 1975; McCann *et al.*, 1975). Although sensitive bacterial assays for forward mutations at specific loci or over some portion of the entire genome may also be appropriate, at the present time the most sensitive and best-characterized bacteria for mutagenicity testing are those capable of indicating reverse mutations at specific loci.

###### 4. Methodology:

(i) *General.* The test shall be performed in all respects in a manner known to give positive results for a wide range of chemical mutagens at low concentrations. Tests must be

run with and without metabolic activation. The sensitivity and reproducibility of the metabolic activation systems and strains used shall be evaluated both by reference to past work with the method and by the concurrent use of positive controls.

(ii) *Plate assays.* In general, the EP extract should be tested by plate incorporation assays at various concentrations. Test conditions should minimize the possible effects due to extraneous nutrients, contamination by other bacteria, and high levels of spontaneous mutants.

(iii) *Liquid suspension assays.* A few chemicals (e.g., diethylnitrosamine and demethylnitrosamine) will give positive results only in tests in which the test substance, the bacteria, and the metabolic activation system are incubated together in liquid prior to plating, but not in a plate incorporation assay (Bartsch *et al.*, 1978). Thus, tests shall be conducted in liquid suspension as well as on agar plates.

(iv) *Doses.* The highest test dose which does not result in excessive cell death shall be used.

##### GROUP II—DETECTION OF GENE MUTATIONS

###### a. Mammalian Somatic Cells in Culture

1. *Choice of cell systems:* A number of tests in mammalian somatic cells in culture are available in which specific locus effects may be detected in response to chemical exposure (Shapiro *et al.*, 1972; Chu, 1971). The cell line used shall have demonstrated sensitivity of chemical induction of specific-locus mutations by a variety of chemicals. The line shall be chosen for ease of cultivation, freedom from biological contaminants such as mycoplasmas, high and reproducible cloning efficiencies, definition of genetic detection, loci, and relative karyotypic stability. The inherent capabilities of the test cells for metabolic activation of promutagens to active mutagens shall also be considered, as well as the use of metabolic activation systems similar to those used with microorganisms.

###### 2. Methodology:

(i) *General.* The test shall be performed in all respects in a manner known to give positive results for a wide range of chemical mutagens. The sensitivity of the system, metabolic activation capability, and its reproducibility must be evaluated by reference to past work and by the concurrent use of positive controls. Culture conditions which may affect the detection of mutations and give falsely high or low figures for reasons other than chemical induction shall be avoided. Definition of detected genetic loci studies and verification that the observed phenotypic changes are indeed genetic alterations should be presented.

###### b. Mutation in Fungi

1. *Controls:* All considerations discussed under Group I, a, are applicable.

2. *Choice of Organisms:* The fungi used shall include strains capable of detecting base pair substitutions (both transitions and transversions) and frame-shift mutations. More inclusive assay systems, such as those designed to detect recessive lethals, are also acceptable. The known spectrum of chemical mutagens capable of being detected by the strains shall be considered when selecting the strains. The strains shall also be highly sensitive to a wide range of chemical mutagens. Strains altered in DNA repair or other capabilities with the intent to in-

crease sensitivity may be used, subsequent to validation. Either forward or reverse mutation assays may be applied.

###### 3. Methodology:

(i) *General:* All considerations discussed under Group I, a, 4, (i) are applicable. *Care should be taken to investigate stage sensitivity, i.e., replicating versus non-replicating cells as well as possible requirement for post-treatment growth.*

(ii) *Plate Assays:* While spot tests and plate incorporation assays are useful for preliminary testing, they shall not be considered conclusive.

##### GROUP III—DETECTING EFFECTS ON DNA REPAIR OR RECOMBINATION AS AN INDICATION OF GENETIC DAMAGE

###### a. DNA Repair in Bacteria

1. *Controls:* All considerations discussed under Group I are applicable.

2. *General:* (i) When the DNA of a cell is damaged by a chemical mutagen, the cell will utilize its DNA repair enzymes in an attempt to correct the damage. Cells which have reduced capability of repairing DNA may be more susceptible to the action of chemical mutagens, as detected by increased cell death rates. For suspension tests using DNA repair-deficient bacteria, the positive control should be similar in toxicity to the test mixture.

(ii) The DNA repair test in bacteria determine if the test substance(s) is more toxic to DNA repair-deficient cells than it is to DNA repair-competent cells. Such differential toxicity is taken as an indication that the chemical interacts with the DNA of the exposed cells to produce increased levels of genetic damage.

3. *Choice of organisms:* Two bacterial strains, with no known genetic differences other than DNA repair capability, shall be used. The strains selected shall be known to be capable of indicating the activity of a wide range of chemical mixtures capable of being detected by the strains and procedures used shall be reported.

###### 4. Methodology:

(i) *Plate test.* The EP extract should be tested by spotting a quantity on an agar plate which has had a lawn of the indicator organisms spread over it. After a suitable incubation period, the zone of inhibition around the spot shall be measured for each strain and compared for the DNA repair-competent and DNA repair-deficient strains. If no discrete zone of inhibition is seen with either strain, then the results of the tests are not meaningful.

(ii) *Liquid suspension test.* The liquid suspension test shall also be performed by comparing the rates at which given concentrations of the test substances will kill each of the two indicator strains when incubated in liquid suspension. Conditions should be adjusted so that significant killing of the DNA repair-competent strain occurs. If this is possible. Methodology is discussed in Kelly *et al.* (1976).

(iii) *Doses.* The dose level of test substances used in the plate or suspension test shall be adjusted so that significant toxicity to the DNA repair-competent strain is measured. In the plate test, this means that a zone of inhibition must be visible; in the suspension test, significant loss of cell viability must be measured. This may not be possible if the test substance is not toxic to the bacteria or if, in the plate test, it does not dissolve in and diffuse through the agar.

The same dose must be used in exposing the DNA repair-competent and repair-deficient strains.

#### b. *Unscheduled DNA Synthesis in Human Diploid Cells*

1. *General*: DNA damage induced by chemical treatment of a cell can be measured as an increase in unscheduled DNA synthesis which is an indication of increased DNA repair. Unrepaired or misrepaired alterations may result in gene mutations or in breaks or exchanges which can lead to deletion and/or duplication of larger gene sequences or to translocations which may affect gene function by position effects (Stich, 1970; Stoltz *et al.*, 1974).

#### 2. *Methodology*:

(i) *General*: Primary or established cell cultures with normal repair function shall be used. Standardized human cell strains from repositories are recommended. Control should be performed to detect changes in scheduled DNA synthesis at appropriate sections in the experimental design. The media conditions shall be optimal for measuring repair synthesis.

(ii) *Dose*: At least five dose levels shall be used and the time in the cycle or cychronous or non-proliferating cells at which exposure takes place shall be given. The maximum compound dose shall induce toxicity, and the dosing period with the test substance shall not be less than sixty minutes.

#### c. *Sister Chromatid Exchange in Mammalian Cells With and Without Metabolic Activation*

1. *Controls*: All considerations discussed under Group I a. are applicable.

2. *General*: Cytological techniques are available to evaluate the genetic damage induced by chemicals. In the past few years a technique has been developed for identifying sister chromatid exchanges much more simply and efficiently than by the autoradiographic method. The method utilizes the fact that a fluorescent stain Hoechst 33258 binds to thymidine-containing DNA but not, or far less efficiently, to BrdUrd-substituted DNA. This means that the order of fluorescence would be brightest for DNA unreplacated in BrdUrd, intermediate for DNA after one round or replication in BrdUrd, and least for DNA following two rounds or replication in BrdUrd. Thus a sister chromatid exchange can be seen as a switch of fluorescence pattern at the point of exchange. Perry and Wolff (Nature 251, 156-158 (1974)) combined Hoechst staining with Giemsa staining such that the brightly fluorescing regions stain darkly with Giemsa, and the dullly fluorescent regions hardly stain at all.

3. *Choice of Organisms*: Chromosomal preparations of human peripheral blood leukocytes or Chinese hamster ovary cells shall be used.

#### 4. *Methodology*:

(i) *General*: The test method must be capable of detecting sister chromatid exchanges. Procedures reported by Perry and Wolff (Nature 251, 156-158 (1974)) and Moorhead *et al.* (Exp. cell Res. 20, 613-616 (1960)) are recommended. Metabolic activation with rat liver S-9 mix should be incorporated whenever it is appropriate.

(ii) *Doses*: Test substances shall be tested to the highest dose where toxicity does not interfere with the test procedure.

#### d. *Mitotic Recombination and/or Gene Conversion in Yeast*

1. *Controls*: All considerations discussed under Group I are applicable.

2. *General*: One can effectively study the chromosomes of eukaryotic microorganisms by employing classical genetic methodologies which depend upon the behavior and interaction of specific markers spaced judiciously within the genome. These methods have been developed over several decades and have been applied in recent years to the study of induced genetic damage (Zimmerman, 1971, 1973, 1975; Brusick and Andrews, 1974).

3. *Choice of organisms*: Diploid strains of yeasts that detect mitotic crossing-over and/or mitotic gene conversion shall be used. Additionally, as appropriate strains are developed, monitoring for induced non-disjunction and other effects may be possible. Mitotic crossing-over shall be detected in a strain or organism in which it is possible, by genetic means, to determine with reasonable certainty that reciprocal exchange of genetic information has occurred.

Strains employed for genetic testing shall be of proven sensitivity to a wide range of mutagens.

#### 4. *Methodology*:

(i) *General*: In general, wastes shall be tested in liquid suspension tests.

#### REFERENCES

Ames, B. N. 1976. The *Salmonella*/microsome mutagenicity test. In *Origins of Human Cancer*. J. D. Watson and H. Blatt, eds. New York: Cold Spring Harbor Laboratory Press.

Ames, B.N., J. McCann, and E. Yamasaki. 1975. Methods for detecting carcinogens and mutagens with the *Salmonella*/mammalian microsome mutagenicity test. *Mut. Res.* 31:347-364.

Bartsch, H., A. Camus, and C. Malaveille. 1976. Comparative incubation system in presence of rat or human tissue fractions. *Mutat. Res.* 37 (2-3): 149-162.

Brusick, D. and H. Andrews. 1974. Comparison of the genetic activity of dimethylnitrosamine, ethyl methane sulfonate, 2-acetylaminofluorene, and ICR-170 in *Saccharomyces cerevisiae* strains D3, D4, and D5 using *in vitro* assays, with and without metabolic activation. *Mut. Res.* 26: 491-500.

Chu, E. H. Y. 1971. Induction and analysis of gene mutations in mammalian cells in culture. In *Chemical Mutagens: Principles and methods for Their Detection*. A. Hollaender, ed. Vol. 2: 411-444. New York: Plenum Press.

Clive, D., and J.F.S. Spector. 1975. Laboratory procedures for assessing specific locus mutations at the TK locus in cultured L5178Y mouse lymphoma cells. *Mut. Res.* 31: 17-29.

Kelley, R.B., M.R. Atkinson, J.A. Huberman, and A. Kornberg. 1969. Excision of thymine dimers and other mismatched sequences by DNA polymerase of *Escherichia coli*. *Nature*. 224: 495-501.

Kelly, W.S. and N.D. Grindley. 1976. POLA6, a mutation affecting DNA binding capacity of DNA-polymerase I. *Nucl. Acid R.* 3 (11): 2971-2984

McCann, J. N., E. Springarn, J. Bobori and B.N. Ames. 1975. Detection of carcinogens as mutagens: bacterial tester strains with R. factor plasmids. *Proc. Natl. Acad. Sci. USA.* 72: 979-983.

Moorhead, P.S., P.C. Nowell, W. J. Mellman, D.M. Battips, and D.A. Hungerford.

1960. Chromosomal preparations of leukocytes cultured from human peripheral blood. *EXP. Cell Res.* 20: 613-616.

Perry, P., and S. Wolff. 1974. New Giemsa method for differential staining of sister chromatids. *Nature* 251 (5471) 156-158.

Sato, K., R.S. Slesinski and J.W. Littlefield. 1972. Chemical mutagenesis at the phosphoribosyltransferase locus in cultured human lymphoblasts. *Proc. Nat. Aca. Sci. USA.* 69: 1244-1248.

Shapiro, N.I., A.E. Khalilov, E.V. Luss, M.I. Marshak, O.N. Petrova, and N.B. Varshaver. 1972. Mutagenesis in cultured mammalian cells. I. Spontaneous gene mutations in human and Chinese hamster cells. *Mut. Res.* 15: 203-214.

Stitch, H.R., R.H.C. San, and Y. Kawazoe. 1971. DNA repair synthesis in mammalian cells exposed to a series of oncogenic and nononcogenic derivatives of 4-nitroquinoline-1-oxide. *Nature* 229: 416-419.

Stoltz, D.R., L.A. Poirier, C.C. Irving, H.F. Stich, J.H. Weisburger, and H.C. Grice. 1974. Evaluation of short-term tests for carcinogenicity. *Tox. Appl. Pharm.* 29: 157-180.

Zimmerman, F.K. 1971. Induction of mitotic gene conversion by mutagens. *Mut. Res.* 11: 327-337.

Zimmerman. 1973. Yeast strain for visual screening for 2 reciprocal products of mitotic crossing over. *Mutat. Res.* 21(5): 263-269.

Zimmerman. 1975. Procedures used in the induction of mitotic recombination and mutation in the yeast, *Saccharomyces cerevisiae*. *Mut. Res.* 31:71-86.

#### APPENDIX XI—BIOACCUMULATION POTENTIAL TEST

(a) *General*: Reverse-phase liquid chromatography is a separation process in which chemicals are injected onto a column of fine particles coated with a nonpolar (water insoluble) oil and then eluted along the column with a polar solvent such as water or methanol. Recent development in this field have produced a permanently bonded reverse-phase column in which long-chain hydrocarbon groups are chemically bonded to the column packing material which leads to a more reproducible separation. The chemicals injected are moved along the column by partitioning between the mobile water phase and the stationary hydrocarbon phase. Mixtures of chemicals can be eluted in order of their hydrophobicity, with water soluble chemicals first and oil soluble chemicals last in proportion to their hydrocarbon/water partition coefficient. Calibration of the instrument using compounds of known octanol/water partition coefficient allows this procedure to be used to determine whether an unknown mixture contains compounds with octanol/water partition coefficients above a designated level.

Specific correlations exist between octanol/water partition coefficients and bioconcentration in fish. This test thus offers a rapid, inexpensive method of identifying those mixtures which contain compounds which pose a potential bioaccumulative hazard.

Compounds with log P 3.0, but which readily biodegrade would not be expected to persist in the environment long enough for accumulation to occur. Thus a degradation option has been included in order to exempt these substances from the hazardous waste control system.

(b) *Chromatography Conditions*. A liquid chromatograph equipped with a high pres-

sure stopflow injector and a 254 nm ultraviolet detector with an 8 ul cell volume and 1 cm path length is employed. The column is a Varian Preparative Micropak C-H (Catalog number 07-000181-00), or its equivalent, consisting of a 250 mm x 8 mm (i.d.) stainless steel cylinder filled with 10 micron lichrosorb to which octadecylsilane is permanently bonded.

The column is operated at ambient temperature. The solvent consists of a mixture of water and methanol (15:85, v/v) which is pumped through the column at 2.0 ml/minute.

(c) Retention Volume Calibration. Chemicals are dissolved in a mixture of acetone and cyclohexane (3:1, v/v). For preparing the calibration curve the quantity of individual chemicals in the solution is adjusted to give a chromatographic peak of at least 25 percent of the recorder scale. Acetone produces a large peak at approximately 2.6 minutes.

Six chemicals for which Log P has been reported are used to calibrate the elution time in units of Log P. The calibration mixture is summarized in Table 1 and includes benzene, bromobenzene, biphenyl, bibenzyl, p,p'-DDE, and 2,3,5,2',5'-pentachlorobiphenyl.

(d) Sensitivity Calibration. The mixture is chromatographed and a calibration curve prepared daily to eliminate small differences due to flow rate or temperature and to follow the retention properties of the column during prolonged use. The calibration is made by plotting Log P vs the logarithm of the absolute retention time (log RT). Figure 1 is an example of such a calibration curve.

(e) Test Procedure. (1) Prepare a calibration curve as described above.

(2) Calculate the geometric mean of the instrumental response to the chemicals listed in Table 1 with the exception of the acetone. This value, expressed in ug/25% full scale deflection, is designated the Instrumental Sensitivity (IS).

(3) Extract X liters of the Extraction Procedure extract to be tested, using dichloromethane, and concentrate the extract to a quantity suitable for injection on to the column. The quantity X is determined by the instrumental sensitivity and is given by the relationship: X in liters=IS in micrograms.

(4) Analyze the extract using the now calibrated chromatograph. A positive response is defined as an instrumental response greater than or equal to 25 percent full scale detector response in the region of Log P greater than or equal to 3.5.

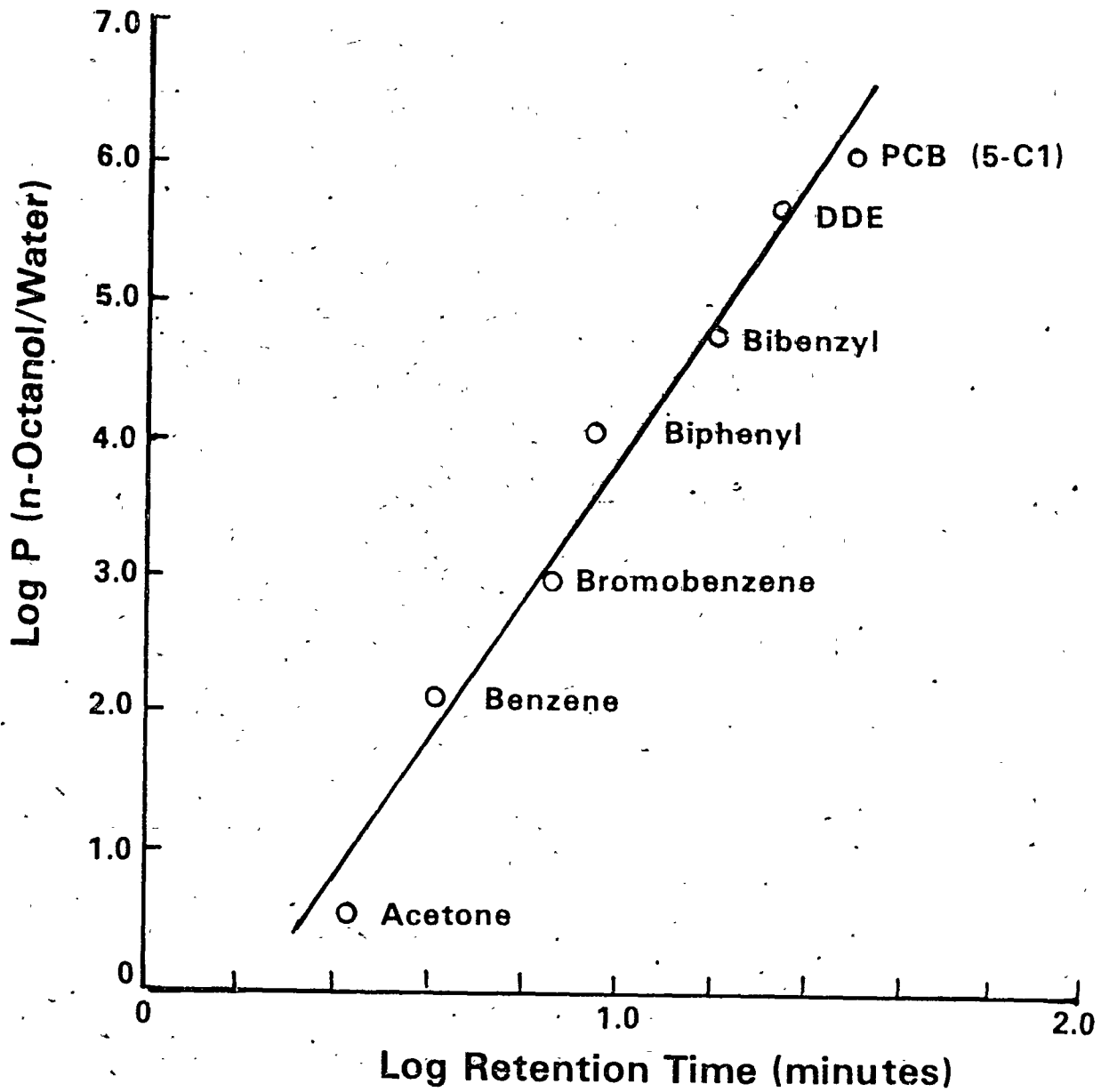
(5) If a positive response is indicated in step (4), then subject a sample of the waste to a biodegradation assay and then retest. If a positive response with the degraded waste is not obtained, then the waste is not considered to be hazardous by reason of bioaccumulativeness.

TABLE I.—Partition Coefficients for Chemicals Used for Calibration

	Log P
Acetone.....	0.55
Benzene.....	2.13
Bromobenzene.....	2.99
Biphenyl.....	3.76
Bibenzyl.....	4.81
p,p'-DDE.....	5.69
2,3,5,2',5'-Pentachlorobiphenyl.....	6.11

[6560-01-C]

Figure 1



[6560-01-M]

(40 CFR PART 250 SUBPART B)

## SECTION 3002—STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE

Section 3002 requires the Administrator to promulgate regulations establishing standards for persons generating waste identified or listed as hazardous under Subpart A (Identification and Listing of Hazardous Waste). These standards are designed to protect human health and the environment by establishing requirements for:

1. Recordkeeping to identify quantities, constituents, and disposition of hazardous waste generated;
2. Labeling of containers used for storage, transport, or disposal of hazardous waste;
3. Use of appropriate containers for hazardous waste;
4. Furnishing information on general chemical composition to persons transporting, treating, storing, or disposing of hazardous waste;
5. A manifest system to assure that hazardous waste is designated for and delivered to a permitted treatment, storage, or disposal facility; and
6. Submission of reports to the Administrator (or authorized State agency) setting out quantities and disposition of hazardous waste.

## WASTE DESIGNATION

It is a generator's responsibility to determine if his waste is hazardous. This determination can be made by evaluating the waste against the characteristics outlined in § 250.13 of Subpart A, or by identifying the waste on the hazardous waste lists presented in § 250.14 of Subpart A.

A person who has knowledge of the raw materials input into his process and knows these materials to be present in the waste may utilize this information to determine whether the waste would match the characteristics set forth in § 250.13 without testing. This can be accomplished by using the manufacturer's specifications and data or by consulting scientific literature and comparing the physical and chemical properties of the raw materials in the waste to the characteristics in § 250.13 which make a waste hazardous.

If a person believes his waste to be hazardous, he may also simply declare it to be so without any references to Subpart A or to scientific literature.

## IDENTIFICATION OF HAZARDOUS WASTE GENERATORS

The Act does not define a hazardous waste "generator;" however, § 1004(6) defines "hazardous waste generation" as "the act or process of producing hazardous waste." EPA has used this language to define a hazardous waste generator as a "person or Federal

Agency whose act or process produces hazardous waste." Examples of generators of hazardous waste are some manufacturers included in SIC codes 20-39, laboratories, and aerial and commercial pesticide applicators.

Although the term "produces hazardous waste" implies that only manufacturers are included in the definition of generator, it is important to point out that a person who accumulates hazardous waste is considered a generator because the process of accumulation results in a hazardous waste disposal problem. For example, a laboratory that accumulates a waste designated as hazardous under Subpart A of these proposed rules would be subject to the requirements in this Subpart.

The Agency has proposed that persons who produce and dispose of less than 100 kilograms (approximately 220 pounds) of hazardous waste in any one month are exempted from the requirements of this Subpart if they comply with the provisions of § 250.29. The 100 kilogram per month level for defining generators was developed as a result of an effort to exclude from this Subpart persons whose generation of small amounts of hazardous waste does not pose a substantial threat to human health or the environment. Based on surveys of industrial waste production in five States (New Jersey, Texas, Illinois, Tennessee, Maryland) and data presented in the Draft Environmental Impact Statement for Subtitle C, it is estimated that the cut-off point of 100 kilograms per month for hazardous waste generation will allow control of 99.5 to 99.9 percent of potentially hazardous industrial waste while at the same time excluding up to 60 percent of the generators in the manufacturing industry (SIC 20-39).

Persons who dispose of less than 100 kilograms must comply with the provisions of Section 250.29. These provisions require that any hazardous waste generated, no matter how small the quantity, be disposed of either in (1) a solid waste facility which has been permitted or otherwise certified by the State as meeting the criteria pursuant to Section 4004 of RCRA; or (2) a treatment, storage, or disposal facility permitted by the Administrator pursuant to the requirements of Subpart E or permitted by an authorized State program pursuant to Subpart F. Compliance with these provisions will assure protection of human health and the environment from the disposal of all hazardous waste.

The Agency has also proposed that retailers and farmers generating any amount of hazardous waste be exempted from the requirements of this Subpart if they comply with the provisions of Section 250.29. Excepted from this are gasoline stations and

companies that accumulate more than 100 kilograms per month of waste oil. Retailers rarely generate hazardous waste in excess of 100 kilograms per month. In the event that a retailer has a need to dispose of more than 100 kilograms of hazardous waste in a given month, this disposal must be in compliance with § 250.29(a). Farmers are exempted because the Federal Insecticide, Fungicide, and Rodenticide Act can be used to control the disposal of excess pesticides and pesticide containers. Pesticides and pesticide containers are likely to be the only hazardous wastes generated by farmers, and disposal will be required in accordance with § 250.29(b).

Gasoline stations and other companies that accumulate and dispose of more than 100 kilograms per month of waste oil will be subject to the requirements of this Subpart. Waste oil presents a special environmental problem because it is ubiquitous and because it is a potential carrier for other hazardous waste and substances. For example, it is sometimes mixed with transformer oil containing PCB's. Regulation of waste oil under this Subpart will tend to direct such oil to permitted treatment or recovery facilities that will promote resource conservation, a major goal of the Act.

The Agency does not anticipate that the requirements of this regulation will impose an undue burden on accumulators of waste oil because transporters and disposers have expressed a willingness to perform the generator's responsibilities under this section for a reasonable fee. Generators who arrange with transporters or disposers to perform their recordkeeping and reporting requirements will be relieved of most of the risk of non-compliance. Section 250.28 of this regulation provides that where a transporter regulated by Subpart C or a disposer regulated by Subparts D and E of this Part contracts with the generator to perform the generator's duties, the transporter or disposer will become independently liable under the Act for failure to perform. Although the generator cannot completely transfer his liability under the Act for a failure to perform, EPA enforcement actions will focus on the delinquent transporter or disposer rather than a generator who has entered into an assumption of duties contract.

Congress did not intend householders to be considered generators, nor did it intend that the type of waste substances normally used in households be included in the Subtitle C regulatory program. (S. Rep. No. 94-988, 94th Cong., 2nd sess. at 16.) Thus, households and similar establishments such as apartment houses, condominiums, and hotels are not included in the Subtitle C program.

To determine whether a person is a generator, that person must first determine if his solid waste is hazardous under Subpart A. If a person's waste is hazardous, if it is accumulated or produced and disposed of at a rate greater than 100 kilograms per month, and if the person is neither a farmer nor a retailer, that person is a generator. A generator must package or contain, label, and transport the waste in accordance with the Department of Transportation regulations for shipments of hazardous materials and with the EPA standards for transportation of hazardous waste (Subpart C). The generator must also notify EPA that he is a generator pursuant to Subpart G. A generator who stores, treats, or disposes of his hazardous waste in a facility which he owns is obligated to satisfy the requirements of Subparts D and E of this Part.

**NOTE.**—The Agency solicits comments on the requirements for generators of small amounts of hazardous waste, and, in particular, on whether the 100 kg/month exemption should be lowered or raised, or whether alternate requirements for small generators should be established. The Agency is considering a 1,000 kg/month exemption and will consider other levels and other means of establishing or conditioning requirements for small generators.

The principal element of this issue is how to balance the need to protect human health and the environment from the adverse impact of potential mismanagement of small quantities of hazardous waste with the need to hold the administrative and economic burden of management of these wastes under RCRA within reasonable and practical limits.

On the one hand, both individual and aggregate small quantities of hazardous waste can and often are mismanaged and therefore can be hazardous to human health and the environment. Consequently, small quantities of hazardous waste must be adequately managed. For this reason, the exemption of 100 kg/month specified in this proposed regulation is not an outright exemption but is only available on the condition that the waste is disposed of in an approved disposal facility under Subtitle D of the Act (typically a local landfill handling municipal refuse) or is treated, stored, or disposed in an approved Subtitle C facility (but the manifest and other recordkeeping and reporting requirements of these proposed rules are not required). In this way, small quantities of hazardous waste will be disposed of in a manner which protects human health and the environment but does not necessitate meeting the administrative requirements of these proposed regulations which are designed principally to maintain cognizance over the management of larger quantities of hazardous waste. If a different exemption, such as 1,000 kg/month, had been proposed, it would have been similarly conditioned to achieve the necessary protection without the administrative

requirements imposed by these proposed rules.

On the other side of the issue, the Agency recognizes that management of small quantities of hazardous waste under these proposed rules (that is, quantities greater than 100 kg/month) does necessitate manifest, recordkeeping, and reporting requirements which are comparatively costly on a cost-per-ton basis and which present a new administrative burden on a large number of generators and transporters. Although there is wide agreement that these burdens are appropriate and necessary for the management of large quantities of hazardous waste, there is considerable debate whether they are necessary for the management of small quantities, particularly if other means can be used to assure that small quantities are adequately treated, disposed, and otherwise handled. In addition, it should be recognized that EPA and/or State regulatory management of small quantities of hazardous waste will require resources. Given that EPA and State resources for managing and enforcing the hazardous waste program will be limited, EPA finds good reason to minimize the administrative requirements on small quantities in order to apply its limited resources to the management and enforcement of requirements on larger quantities.

In recognition of the foregoing considerations, the Agency intends to consider a wide range of alternative means of regulating small quantities of hazardous waste and invites comments on all of the following methods and any other methods:

1. The conditioned exemption of quantities of hazardous waste up to 100 kg/month, as proposed.
2. The conditioned exemption of a different quantity of hazardous waste, up to 1,000 kg/month.
3. The conditioned exemption of different quantities of hazardous waste depending on the degree of hazard of the waste (for example, the exemption of quantities of less than 100 kg/month for highly hazardous waste and quantities less than 1,000 kg/month for all other hazardous waste).
4. The unconditioned Federal exemption of small quantities of hazardous waste (e.g., quantities less than 100 kg/month) where a State undertakes the regulation of these exempted wastes as part of its approved hazardous waste program under Section 3006 of the Act or under its approved State plan and regulatory program under Subtitle D of the Act.
5. Applying lesser administrative requirements (e.g., applying manifest requirements but not recordkeeping and reporting requirements) and/or lesser technical treatment, storage, and disposal requirements on small quantities of hazardous waste, without exempt-

ing or conditionally exempting such waste from Subtitle C management.

6. Phasing regulatory coverage of small quantities (e.g., an initial conditioned exemption of quantities at a high cutoff level, and the imposition of a lower exemption limit in two or three years).

Alternative 2 is a variation of that being proposed. Alternative 3 is another variation which requires the classification of hazardous waste by degree of hazard. The Agency has considered such classification but has found that it lacks sufficient data as of the date of this proposal to distinguish among the degrees of hazard of various waste on the basis of its potential to cause health or environmental harm, since the type of hazard potential varies as the waste moves through the storage, transport, and treatment/disposal phases of the waste management cycle. Alternative 4 rests on the proposition that the States are capable of designing and implementing regulatory programs for small quantities of hazardous waste that can be tailored to achieve the most efficient and effective management of such waste because the States are closer to the problem and can develop management solutions that EPA cannot develop in nationwide rulemaking. Alternative 5 reduces the administrative and possibly the technical requirements for managing small quantities of hazardous waste on the presumption that the strict control over management is less critical because of the smaller quantities being handled. There are several variations of this alternative including the scope of the requirements imposed and the quantities covered (less than 100 kg/month, less than 1,000 kg/month, etc.). Finally, Alternative 6 recognizes the difficulty that EPA and the States will have in being able to fully implement and enforce requirements on generators of small quantities of hazardous waste during the initial several years of implementation because priority attention will be given to regulating generators of larger quantities. Given this reality, phasing of coverage may be justified.

EPA has limited data on the numbers of generators of small quantities of hazardous waste, the amount and types of such wastes generated, the current management of these wastes, and their actual and potential impacts on human health and the environment. Consequently, the Agency is finding it difficult to resolve this issue of how best to regulate small quantities of hazardous waste. Clearly, the proposed conditional exemption of 100 kg/month is a conservative (but not the most conservative) approach designed to guarantee adequate management of small quantities of hazardous waste. If this approach is to be



changed, the Agency will need additional data to support that change in order to ensure necessary protection of human health and the environment. Accordingly, the public is invited to supply whatever factual information and quantified data it might have on the nature and scope of adequately managing small quantities of hazardous waste.

The Agency wishes to emphasize that it recognizes that the regulation of generators of hazardous waste has important economic implications for some industries. Preliminary economic analysis based on a 100 kg/month cutoff level indicate the potential for large economic impacts on up to 15 product segments of certain industry categories. These impacts include the possibility of plant closures in some of these segments. Details are discussed in the Draft Economic Impact Analysis for Subtitle C. It is not clear whether raising the cutoff level to 1000 kg/month would alleviate these impacts.

It is also not clear to what extent RCRA allows economic impact to be taken into account, since the Act is silent on this point. Thus, the Agency is faced with the problem of how to deal with these potential impacts with little detailed economic data and without clear Congressional guidance.

The Agency considered proposing a temporary exemption from these regulations of industry segments where Subtitle C economic impacts are expected to be most severe. However, this approach appears questionable on legal and equity grounds. The Agency intends to conduct more detailed economic studies of highly impacted industry segments in the next several months to develop more data. Also, the Agency intends to explore alternatives to deal with this problem, including phased implementation, and may provide some relief from compliance with all Subtitle C requirements to highly impacted industry segments in the final rulemaking. The Agency solicits comment with discussion of alternatives and supporting data relevant to this issue.

#### GENERATOR COMPLIANCE WITH SUBPARTS D AND E OF PART 250

As a general rule, generators of hazardous waste must assure that their wastes are treated, stored, or disposed of only at a facility which has a permit issued pursuant to Subpart E. A generator may not send his hazardous waste to a facility in the United States which does not have a permit issued pursuant to this Part, except for facilities which have interim status pursuant to Section 3005(e) of the Act.

Generators who store hazardous waste on-site prior to shipment for less than 90 days in DOT specification con-

tainers need not comply with Subpart D (Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities). Neither does such storage require a permit pursuant to Subpart E. However, on-site storage of hazardous waste for less than 90 days, other than in DOT specification containers, must be done in permanent storage tanks which meet the Subpart D requirements. The term "on-site" means on the same or geographically contiguous property where hazardous waste generation occurs; two or more pieces of property which are geographically contiguous and are divided only by public or private right(s)-of-way are considered a single site.

**NOTE.**—Comment is requested on any environmental or human health risk which may exist by exempting on-site temporary waste storage in DOT specification containers from the requirements of Subparts D and E.

#### GENERATOR COMPLIANCE WITH DOT HAZARDOUS MATERIALS SHIPPING REGULATIONS

According to a recent interpretation by the Department of Transportation (DOT), Materials Transportation Bureau Office of Hazardous Materials Operations, any material, including waste, which meets the DOT criteria of hazardous material must be handled according to DOT regulations.

The Office of Hazardous Materials newsletter of April/May 1977 states:

There have been numerous inquiries to the Office of Hazardous Materials Operations regarding the applicability of the Department's Hazardous Materials Regulations to the transportation of waste materials. DOT's regulations are structured to apply to any material that may pose an undue hazard in transportation and, as such, do not differentiate between waste and other than waste material. If, after processing, a material (waste) meets the definition of hazardous material, it must be classed and shipped in accordance with the prescribed requirements. Many materials, including those considered waste materials, may have more than one hazard, while other materials may lose their hazardous characteristics due to processing. A mixture of materials, both waste and other than waste, must be properly evaluated to determine its characteristics, since after processing, a mixture may become more or less hazardous than it was prior to processing. The Department's Hazardous Materials Regulations may apply to any material regardless of its end use. The fact that material is considered a waste material does not relieve application of these (DOT) regulations.

DOT's current Hazardous Materials Transportation Regulations apply only to generators who use transporters engaged in interstate or foreign commerce. Some intrastate shipments are regulated by States that have adopted the Federal regulations or have similar regulations. In the above cases, the shipper is usually responsi-

ble for proper description of the hazardous material, proper labeling, packaging, and placarding.

DOT regulations applicable to generators of hazardous materials are found in the Code of Federal Regulations Title 49, Parts 171 (General Information, Regulations and Definitions); 172 (Hazardous Materials Table and Hazardous Materials Communications Regulations); 173 (Shipping Container Specifications); and 179 (Specifications for Tank Cars).

EPA's proposed Section 250.30, Subpart C (Standards Applicable to Transporters of Hazardous Waste) requires that when a material is both a hazardous waste as defined by EPA and a hazardous material as defined by DOT, the provisions of the U.S. DOT Hazardous Materials Regulations must be complied with for intrastate as well as interstate transportation.

**NOTE.**—For those hazardous wastes not currently subject to the DOT Hazardous Materials Regulations (primarily toxic materials), EPA recognizes DOT's primary mandate for the development of standards concerning the safety aspects of loading, unloading, communication of hazard, packaging, and handling of materials in transportation. Since EPA anticipates that DOT will redefine hazardous materials to include all hazardous waste, DOT should develop such safety standards. To the extent that problems are identified by EPA and DOT regarding additional safety measures for these newly covered wastes, the two agencies will develop appropriate revisions to the currently anticipated rulemakings. Comments are requested concerning additional safety measures that may be needed for hazardous waste.

Compliance with EPA's hazardous waste regulations (which include by reference parts of DOT's Hazardous Materials Transportation Regulations) by no means exempts the generator from compliance with the requirements of other Federal, State, or local regulations.

The standards set forth under Subparts B and C are consistent with standards developed under the Hazardous Materials Transportation Act (49 CFR 100-189). After lengthy negotiations between EPA and DOT, DOT has expressed a strong interest in broadening its Hazardous Materials Regulations to include most or all of EPA's proposed hazardous waste regulations. Depending on DOT's actions, EPA may jointly promulgate regulations with DOT, modify regulations previously proposed, or adopt forthcoming DOT regulations. EPA and DOT intend to jointly enforce any DOT regulations governing transportation of hazardous waste.

#### SPECIFIC STANDARDS

The following standards outline the requirements which must be undertaken by the generator, his agent, or his



private contractor to be in compliance with Subpart B of the Act: Manifest, Reporting, Recordkeeping, Identification Codes, Containers, Labeling Practices, Confidential Information and Presumption, and Waste Oil Assumption of Duties Contract.

#### THE MANIFEST

The manifest is a tracking document designed to record the movement of hazardous waste from the generator's premises to an authorized off-site treatment, storage, or disposal facility (see Figure 1 of the Subpart B regulations). On-site waste management does not require a manifest, but does require a permit issued under Subpart E. The generator designates on the manifest the address of one or more permitted facilities where the waste is to be delivered and signs it. The transporter's signature on the manifest indicates that he has received the hazardous waste and will comply with the generator's instructions. When the waste arrives at the permitted waste management facility, the facility owner/operator must sign the manifest and send the original to the generator. If the generator does not receive a copy of the manifest (or delivery document certifying receipt) from the permitted facility within 30 days, he is obligated to report this fact to EPA. Moreover, the generator must maintain a copy of both the initial and final manifest or delivery document for designated periods of time.

To complete the manifest, the generator must supply information in accordance with § 250.22. Any authorized person (e.g., transporter, disposer) may fill out the manifest on behalf of the generator, but the generator must sign it.

Much of the information required by DOT on a hazardous material shipping paper is also required by EPA on the manifest.

Both agencies require specific information to appear on the document in a certain order, but allow the shipper (generator, transporter, etc.) to prepare the document and add any additional information as necessary. A manifest *per se* need not accompany the shipment of hazardous waste if information required by § 250.22 accompanies the shipment in another form, e.g., on a bill of lading or hazardous material shipping paper. Similarly, a single manifest may be used for multiple shipments on the same day of hazardous waste from a single generator by the same transporter to the same facility as long as the shipping description and hazard class for each shipment is identical, the quantity per shipment is stated on the manifest, and an accounting of each shipment is documented on the manifest.

The following information which must be included on the DOT shipping paper (see 49 CFR 172.200) is also required on the manifest: the shipping description of the waste; the hazard class of the waste; the total quantity of each waste; the volume or weight of the waste, or type of container the waste was shipped in; and the shipper's certification.

**Shipping Description.** Section 250.22(h)(5) prescribes the procedure for determining the name of the hazardous waste which will appear on the manifest under the column entitled "Shipping Description." If the waste is regulated by the DOT, the generator must first review the DOT list of proper shipping names for hazardous materials found in 49 CFR 172. The DOT proper shipping name that most appropriately describes the hazardous waste must be used on the manifest. If the DOT proper shipping name is not applicable, or if the DOT proper shipping name contains the words "NOT OTHERWISE SPECIFIED" (NOS), the generator should review the list of EPA name(s) located in § 250.14 of Subpart A. If there is no DOT proper shipping name (NOS or otherwise) and the EPA name describes the hazardous waste, the EPA name must appear on the manifest.

If the DOT proper shipping name which most appropriately describes the hazardous waste is NOS, and there is an EPA name, then both NOS and the EPA name should appear on the manifest in that order. If there is no EPA name, then only NOS should appear on the manifest. If the waste is not regulated by DOT, the EPA proper shipping name must be used on the manifest.

Both the DOT proper shipping names and the EPA names will have common codes assigned to them which will be listed in EPA's final promulgation of Subpart A. These common codes need not appear on the manifest, but must appear on the quarterly and annual reports.

**Hazard Class.** The generator must next determine the hazard class associated with the hazardous waste, e.g., "corrosive." This procedure is prescribed in § 250.22(h)(6). If the waste is regulated by DOT, the generator must first determine the DOT hazard class describing the hazardous waste, then place that DOT hazard class on the manifest. If no DOT hazard class describes the hazardous waste, then the EPA characteristic from § 250.13 or property identified in § 250.14 of Subpart A must appear on the manifest. However, if the (only) DOT hazard class which describes the hazardous waste is "OTHER REGULATED MATERIALS" (ORM), then the EPA characteristic or property must also appear on the manifest. When both a

DOT and an EPA name are used on the manifest under either "Shipping Description" or "Hazard Class," the DOT name must precede the EPA name. If waste is unregulated by DOT, the EPA waste characteristic or property must appear on the manifest.

The DOT shipping paper format may be utilized by a generator as a basis for meeting EPA requirements. If the generator already uses DOT shipping papers, the generator may modify them for hazardous waste shipment by adding certain information and the words "and the U.S. Environmental Protection Agency" after the words "Department of Transportation" on the certification statement. Items of information required by EPA but not DOT include the following: a manifest document number; the names, addresses, and identification codes of the generator, transporter, and treatment, storage, and disposal facility operator; the signatures of all parties (except for transfer between transporters using rail, water, or other modes of transportation); special handling information; comments; and emergency information.

The manifest document number is a serially increasing number which the generator assigns to the manifest for the purposes of recordkeeping. This document number, in addition to the identification code given to generators, transporters, and treatment, storage, and disposal facilities (TSDF), will aid EPA in identifying specific incomplete hazardous waste shipments, i.e., those which do not arrive at the TSDF designated on the manifest.

The names, addresses, and signatures of the generator, transporter, and treatment, storage, and disposal facility operator on the manifest will verify the routing of the hazardous waste. The TSDF operator will return the original of the manifest or delivery document to the generator to confirm that all waste shipped is actually received. The generator may designate several transporters and TSDF's which will each handle a part of the waste, or handle the waste sequentially, i.e., from a transfer station to a TSDF. These several transporters and TSDF's may be listed sequentially or in order of priority. If the waste is sent to a transfer station, a new manifest is not required so long as the waste's hazard characteristic identified by the generator pursuant to Subpart A does not change. Otherwise, the owner of the transfer station will be considered a generator and will be required to fill out a new manifest and properly relabel and contain the waste. In the case of international shipments, the foreign TSDF is not subject to permitting pursuant to Subpart E and, therefore, will not have an identification code. In this case, the

generator, when completing the manifest, is required to give the name and address of the foreign TSDF.

An example of special handling information to be included on the manifest would be instructions to keep a container away from contact with other containers. An example of a comment would be a warning that the containers are only partially filled or that a copy of an earlier manifest has not been returned by the TSDF operator verifying receipt of a hazardous waste shipment.

Emergency information is intended to inform persons on the scene of a spill what action to take before trained personnel arrive, e.g., whether the spill should be diluted with water or contained. A 24-hour emergency number may be specified in lieu of emergency information. In addition, the generator must list the toll free number of the National Response Center of the U.S. Coast Guard (800-424-8802) on the manifest preceded by the words "In the event of a spill contact the National Response Center, U.S. Coast Guard."

**NOTE.**—It is EPA's intent that the hazardous waste manifest format described in Section 250.22 will be used for all hazardous waste shipments throughout the country to ensure national consistency. States may demand more information, but not less than required by EPA/DOT. It has been suggested that in States authorized pursuant to Subpart F, inconsistent additions to the manifest format might be required. However, DOT has the authority under Section 112 of the Hazardous Materials Transportation Act to preempt any such additional requirements that are inconsistent with DOT requirements. Therefore, EPA contemplates assuring through the State authorization process that state manifest formats and related transportation standards are not inconsistent with DOT standards. Comments on this approach or other alternatives are solicited.

#### REPORTING

The information on the manifest will be the basis for the generator's reports either to a State agency authorized pursuant to Subpart F (Guidelines for Authorized State Hazardous Waste Programs) or to an EPA Regional Office. In the EPA-administered program, the manifest itself stays in commercial channels. If the State in which the generator is located has an EPA-approved hazardous waste program, reports and/or manifests will be sent to that State in accordance with State regulations. In States where EPA is implementing the program, the EPA Regional Office will receive the reports. EPA will list authorized State agencies in the FEDERAL REGISTER.

In the case of international shipments to a foreign disposer, the generator must send quarterly reports to the EPA Regional Office or author-

ized State agency having regulatory jurisdiction over him and retain a copy of the manifest, which was sent with the shipments to the foreign TSDF, for a period of three years. Since the foreign disposal facility does not have to report, the Agency feels it necessary to require a more frequent (quarterly) report from the generator (as opposed to the annual report required for domestic shipments) to facilitate tracking.

**NOTE.**—EPA is considering a requirement that generators who ship hazardous waste to foreign TSDF's must notify both EPA and the foreign Government having jurisdiction over the receiving facility before such shipments are made. Comment is solicited on this point.

For domestic shipments of hazardous waste, the generator must file reports annually no later than 30 days after September 30, the closing date of the reporting year. The report will be filed on a standard EPA form (See Figure 2 of the Subpart B regulations) containing the information required in § 250.23.

When a generator fails to receive a signed original of a manifest from a designated domestic or foreign disposal facility, the shipment may have been lost in transport or illegally disposed or mismanaged. Instances of unreturned manifests must be described in quarterly "exception" reports submitted to an authorized State agency pursuant to Subpart F, or to the appropriate EPA Regional Office. All quarterly reports must be filed no later than 30 days after the closing date of the reporting quarter; those closing dates are the last day of March, June, September, and December. The report will be filed on a standard EPA form as specified in Figure 2 of Subpart B.

The reporting scheme of quarterly exceptions reports was chosen because it minimizes the reporting requirement on the generator while providing EPA and States with a sufficient amount of information to track violations of the manifest system. The burden of monitoring the movement of hazardous waste is on the generator. He must screen all manifests received from facilities to ensure the waste was properly delivered to the appropriate facility. It is to the generator's advantage to report any incomplete or inappropriate transporter or receiver activities so that he may protect himself from undue liability for improper management of the waste.

**NOTE.**—In the development of the manifest system and associated reporting requirements proposed in these regulations, the Agency has considered several options, is pursuing analyses of some of them, and may well choose to promulgate different requirements at final rulemaking. Options under consideration include:

(1) Requiring quarterly, rather than annual, reports on each manifested shipment of hazardous waste.

(2) Requiring that a copy of each manifest be sent to the Regional Administrator on a quarterly basis.

(3) Requiring that whenever a generator has reason to believe that a hazardous waste shipment has been spilled or delivered to a facility not permitted to receive the waste in the shipment, the generator must immediately report this information to the Regional Administrator. This report would include a copy of the manifest and all information which the generator has concerning the transport and disposition of the shipment, including but not limited to the parties involved and the generator's source of information.

(4) Requiring that a generator who has not received the original manifest from the facility designated on the manifest within 35 days after the date of shipment, or who determines that the returned manifest is inconsistent with the original manifest, must:

(a) Take all actions necessary to determine the cause of non-receipt or inconsistency;

(b) Assure that all steps are being taken to locate and receive the manifest and to assure that the waste is properly disposed of;

(c) If he has been unable to accomplish his requirements under (a) and (b) above, within 30 days, the generator must prepare and submit a report to the Regional Administrator. This report must be submitted within 65 days after the date of shipment, and must contain the information required in § 250.23(c) except (2). In addition, this report must include:

1. The name, address and identification code of the designated facility;

2. The actions which have been or will be taken by the generator to determine the reason the original manifest was not returned;

3. The results of the generator's investigation, including any and all information involving the shipment and cause of non-receipt; and

4. The identity of all parties who may be responsible for the non-receipt of the manifest.

Comment with supporting data, where possible, is solicited on the proposed regulations, the options described above, and any alternative schemes which enhance the enforceability of these regulations.

Generators who store, treat, or dispose of hazardous waste on-site must specify this fact on their report by writing the word "on-site" under the column titled "Treatment, Storage, or Disposal Facility ID. Code." Generators who store, treat, or dispose of hazardous waste off-site must write the identification code of the TSDF receiving the shipment of hazardous waste in that column. When the shipment of hazardous waste is designated to a TSDF outside the United States, the generator need only supply the name and address of the facility.

The following additional information is required on the report: the generator's identification code, name, and address; the closing date for that re-

porting year or quarter; the shipping description (name and common code) of the waste; the hazard class of the waste; the total quantity of each waste; the volume or weight of the waste, and the generator's signature.

Section 250.22(h)(5) describes how the generator who treats, stores, or disposes of hazardous waste on-site is to determine the name of the hazardous waste which will appear on the report under "Shipping Description." The same sequence described earlier in this preamble to determine the "Shipping Description" for a manifest applies to this report (see *Shipping Description* in the preamble section entitled *The Manifest*).

The generator who treats, stores, or disposes of hazardous waste on-site must next determine the hazard class associated with the hazardous waste as described under § 250.22(h)(6). The same sequence described earlier in this preamble for determining hazard class on the manifest applies here (see *Hazard Class* in the preamble section entitled *The Manifest*).

A generator who treats, stores, or disposes of hazardous waste off-site at a permitted facility that the generator does not own must transfer selected information described by § 250.23(b) from the manifest and submit this information on his report. The reports filed by the generator and the TSDF will be matched by EPA or an authorized State to ensure that all hazardous waste shipped was received at its designated destination.

A generator who treats, stores, and disposes off-site at a TSDF that the generator owns is not required to file a generator report; however, he must have a DOT shipping paper and must file the report required of owners and operators of treatment, storage, and disposal facilities pursuant to Subpart D.

In all cases, the shipping description (name) of the hazardous waste must be followed by its common code on the report. This common code will be published with the hazardous waste list in Subpart A.

#### RECORDKEEPING

If a generator ships a hazardous waste off-site to a TSDF which is not his own, a signed copy of the completed manifest (as required in § 250.22) for each shipment must be kept as a record. This record must be retained by the generator for a period of three years from the date of shipment.

Generators who treat, store, or dispose of their waste at their own treatment, storage, or disposal facilities are required to keep records as facility operators under Subpart D, rather than as generators.

#### IDENTIFICATION CODES

Section 250.24 of these regulations requires that every generator of hazardous waste furnish information to EPA or an authorized State about its hazardous waste generation activity. Upon submission of this information, the generator will be issued an identification code. The identification code will, in most cases, be identical to existing codes assigned to generators by other Federal or State agencies. The identification code should not be construed as a seal of approval by EPA or the issuance of a license or permit.

#### CONTAINERS

Generators who treat, store, or dispose of hazardous waste off-site must place their hazardous waste in a container that meets DOT requirements. (See 49 CFR 173, 178, and 179) for shipment or place it in a permanent storage tank (meeting requirements of § 250.44-1, of Subpart D) until shipment. Generators who store hazardous waste for less than 90 days prior to treatment or disposal on-site are not required to comply with the DOT container standards. If a generator stores a hazardous waste for greater than 90 days, he must comply with the standards pursuant to Subparts D and E for hazardous waste facilities.

NOTE.—Presently, there are no contingency spill plans required for generators who store hazardous waste less than 90 days. The Agency will develop further regulations on this subject if public comment and supporting data indicate that these proposed regulations are inadequate to ensure protection of human health and the environment. Such comment and information are solicited by this notice.

#### LABELING PRACTICES

Generators who ship hazardous waste off-site must label and placard the shipment in accordance with DOT requirements under 49 CFR 172.

The generator must mark each package in accordance with DOT requirements under 49 CFR 172.300. When marking a package, the generator must follow the same naming procedure described earlier in the section on the Manifest under *Shipping Description*. In addition, the generator must mark each package with his identification code and the manifest document number for that shipment and the words "CONTROLLED WASTE—Federal Law Prohibits Improper Disposal," as prescribed in Section 250.26(c).

Generators who store hazardous waste for on-site treatment, storage, or disposal are not required to comply with EPA's marking and labeling standards. However, generators are subject to any applicable Federal Occupational Safety and Health Administration regulations or State agency regulations regarding labeling, plac-

arding, and marking in the workplace.

NOTE.—The Agency will develop further regulations on this subject if public comment and supporting data indicate that these proposed regulations are inadequate to ensure protection of human health and the environment. Such comment and information are solicited by this notice.

#### CONFIDENTIAL INFORMATION

Section 250.27 allows the generator to request that certain information about his waste included on the manifest or reports to EPA be treated as proprietary by writing "CONFIDENTIAL" or a similar designation next to the sensitive items. If the information is requested by members of the public, the Administrator of EPA will issue a ruling on whether the information is confidential under the Freedom of Information Act. See 5 U.S.C. Section 552(b)(4). This procedure is described in more detail in 40 CFR Part 2.

#### GENERATORS OF WASTE OIL

Special problems have resulted from the indiscriminate disposal of waste oil. In an effort to lessen the regulatory burden on the large number of generators of waste oil as well as to promote resource recovery, these regulations provide for a procedure whereby any transporter regulated under Subpart C or treater, storer, or disposer regulated under Subpart D may assume a generator's responsibility for all obligations imposed by this regulation (except the duty to apply for a generator identification code under § 250.24).

Section 250.28 of the regulations outlines the requirements for a contractual agreement which must be formed between the generator and the transporter or treater/storer/disposer assuming the generator's responsibilities. Once that contract is in place, a transporter or treater/storer/disposer becomes liable to properly perform the applicable duties therein. Although the generator cannot completely transfer his own liability under the Act for a failure to perform, EPA enforcement actions will focus on the delinquent transporter or treater/storer/disposer rather than the generator if the proper contractual agreement is in force.

There is, of course, nothing to prevent a generator from contracting with any agent or independent contractor who is not a generator, transporter or treater/storer/disposer to perform the duties required under this regulation. However, since EPA has no direct regulatory authority over such persons, it could not bring an enforcement action against them. If such a person fails to perform his responsibilities, EPA would be obligated to enforce against the generator. The gen-

erator's remedy would be limited to a breach of contract action against his agent or independent contractor.

NOTE.—Comment is specifically requested on this regulatory approach and possible alternatives for regulatory coverage.

#### STATE PROGRAMS

These regulations describe the requirements to be met by generators where implementation of the Act is managed by EPA. Where States have been authorized by EPA, they will be carrying out implementation programs of their own in lieu of the program described in this section. Such State programs must be no less stringent than the program described in these regulations and must be judged to provide an equivalent degree of control over hazardous waste. However, the manner in which States achieve this control may vary considerably from the Federal program. Requirements for authorization of State programs are described in Subpart F.

#### ENFORCEMENT POLICY

The objective of the Agency's hazardous waste management program is to insure that hazardous wastes are identified and competently controlled from the point of generation, through transportation, to ultimate disposition at a permitted treatment, storage, or disposal facility. The most important aspect of this control program is the identification and inclusion of hazardous wastes in the control system.

Much of the initial responsibility of this control program falls on the shoulders of the generator. The generator must identify his waste as hazardous, and insure that his waste is placed in the hazardous waste management system, either by handling the waste on-site in a permitted facility or by shipping it off-site to be handled at a permitted facility. In addition, it is the generator's responsibility to bring to the attention of the Agency any shipments of waste for which he has not received a confirmation of delivery.

Because of this regulatory emphasis, EPA will focus a significant amount of its compliance monitoring and enforcement effort on the generator. Failure to comply with any of these requirements will cause the violator to be prosecuted to the full extent of the law. Section 3008 of RCRA provides for criminal penalties and civil fines of up to \$25,000 per day per violation, and EPA intends to seek maximum penalties for such violations.

One exception to this overall strategy concerns waste oil generators. A waste oil generator who contracts out his Subpart B responsibilities to a transporter or a permitted hazardous waste management facility will not likely be an enforcement priority. The

compliance monitoring effort will, in this case, be on the contractor.

#### BACKGROUND DOCUMENT

A background document is being developed in support of these proposed rules. This document is in the draft stage, and is subject to change as new data and information are received. Copies of the draft will be available for review in the EPA Regional Office libraries and in the EPA library reading room, Room 2404, Waterside Mall, 401 M Street, S.W., Washington, D.C.

#### ECONOMIC, ENVIRONMENTAL, AND REGULATORY IMPACTS

In accordance with Executive Order 11821, as amended by Executive Order 11949, and OMB Circular A-107, EPA policy as stipulated in 39 FR 37419, October 21, 1974, and Executive Order 12044, respectively, analyses of the economic, environmental, and regulatory impacts are being performed for the entirety of Subtitle C, Hazardous Waste Management. Drafts of these analyses have been completed and will be available for review by January 8, 1979, in the EPA Regional Office libraries and the EPA library reading room, Room 2404, Waterside Mall, 401 M Street, S.W., Washington, D.C. Final versions of these documents will be issued at the time of promulgation.

Dated: December 11, 1978.

DOUGLAS COSTLE,  
Administrator.

It is proposed to amend Title 40, CFR, Part 250 by adding a new Subpart B consisting of Section 250.20-250.29 as follows:

#### Subpart B—Standards Applicable to Generators of Hazardous Waste

- Sec. 250.20 Purpose, scope, and applicability.
- 250.21 Definitions.
- 250.22 Manifest.
- 250.23 Reporting.
- 250.24 Identification codes.
- 250.25 Containers.
- 250.26 Labeling practices.
- 250.27 Confidential information and presumption.
- 250.28 Waste oil assumption of duties contract.
- 250.29 Persons who dispose of less than 100 kilograms per month of hazardous waste; retailers; and farmers.

Figure 1—Sample Manifest Format  
Figure 2—Sample Generator Report Form

Authority: Secs. 2002(a), 3002, 3003, and 3004, Pub. L. 94-580, 90 Stat. 2804, 2806, 2807 (42 U.S.C. 6912, 6922, 6923, 6924)

#### Subpart B—Standards Applicable to Generators of Hazardous Waste

§ 250.20 Purpose, scope, and applicability.

(a) The purpose of these regulations is to establish standards for the man-

agement of hazardous waste by generators.

(b) In order to receive EPA approval under Subpart F (State Program Requirements), States must demonstrate that their programs cover at least the same universe of generators and contain standards that are equivalent in degree of control to, and are at least as stringent as, the standards contained in this Subpart. However, even where State programs are approved, EPA retains independent authority to enforce the standards in this Subpart pursuant to Section 3008 of the Act.

(c) Any person or Federal Agency who generates a solid waste must determine, pursuant to Subpart A, if the waste is hazardous. If it is and if that person meets the definition of a generator contained in § 250.21(b)(9) herein, he must comply with this regulation to the degree and in the manner specified below.

NOTE.—Failure to properly designate a waste as a hazardous waste, if the waste is a hazardous waste as identified or listed in Subpart A of this Part, constitutes a violation of the Act and may subject the person or Federal Agency to the compliance requirements and penalties prescribed in Section 3008 of the Act.

(1) Generators must send hazardous waste to a treatment, storage, or disposal facility permitted by the Administrator pursuant to the requirements of Subpart E and shall comply with the requirements of this Subpart as follows:

(i) If the generator sends the hazardous waste to an off-site treatment, storage or disposal facility which the generator does not own or the generator owns but which is not located in the State where generation of the hazardous waste occurred, the generator shall comply with all requirements of this Subpart except §§ 250.23 (d), (e), (f), (g), and (h) and 250.28.

(ii) If the generator sends the hazardous waste to an off-site facility within the United States which the generator owns and which is located in the same State where generation of the hazardous waste occurred, the generator shall comply with the requirements of § 250.43-5 of Subpart D of this Part and all requirements of this Subpart, except §§ 250.23 and 250.28.

(iii) If the generator sends the hazardous waste to an on-site treatment, storage or disposal facility, the generator shall comply with all requirements of this Subpart except §§ 250.22, 250.23 (a), (b), (c), (f), (g), (h), 250.25, 250.26, and 250.28.

(iv) If the generator sends the hazardous waste to an off-site treatment, storage, or disposal facility outside of the United States, the generator shall comply with all requirements of this

Subpart except §§ 250.23 (d), (e), (f), (g), (h) and 250.28.

NOTE.—If the generator sends the hazardous waste to an on-site treatment, storage, or disposal facility or an off-site treatment, storage, or disposal facility within the United States which the generator owns, the generator is also an operator of a treatment, storage, or disposal facility and shall comply with the requirements of Subpart D of this Part and shall obtain a permit from the Administrator for the operation of the facility pursuant to the requirements of Subpart E of this Part or shall comply with State requirements where the State has jurisdiction pursuant to Subpart F of this Part.

(2) Every generator must comply with Subpart D and Subpart E of this Part if the waste remains on-site for 90 days or longer.

(3) Any generator who ships his waste to a treatment, storage or disposal facility outside the jurisdiction of the United States must inform the foreign government having jurisdiction over the designated facility.

(4) Any person or Federal Agency who generates only household refuse or household septic tank pumpings is not required to comply with the requirements of this Subpart.

(5) Retailers, farmers and persons or Federal Agencies who produce and dispose of less than 100 kilograms per month of hazardous waste are specially regulated under § 250.29 of this regulation. In addition, special reporting requirements apply under § 250.23 to persons who assume a generator's responsibilities under this Subpart for waste oil.

#### § 250.21 Definitions.

(a) When used in this Subpart, the following terms have the meanings given in the Act:

- (1) "Administrator"—Section 1004(1)
  - (2) "Disposal"—Section 1004(3)
  - (3) "Federal Agency"—Section 1004(4)
  - (4) "Hazardous waste management"—Section 1004(7)
  - (5) "Person"—Section 1004(15)
  - (6) "Sludge"—Section 1004(26A)
  - (7) "Solid waste"—Section 1004(27)
  - (8) "Solid waste management"—Section 1004(28)
  - (9) "Solid waste management facility"—Section 1004(29)
  - (10) "State"—Section 1004(31)
  - (11) "Storage"—Section 1004(33)
  - (12) "Treatment"—Section 1004(34)
- (b) Other terms used in this Subpart have the following meanings:

(1) "Act" means the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, Public Law 94-580.

(2) "Closing date" means the date which marks the end of a reporting quarter or reporting year.

(3) "Common code" means the unique code assigned by the Chemical

Abstract Services to each EPA hazardous waste and to each DOT hazardous waste material listed in § 250.14 of Subpart A.

(4) "Delivery document" means a shipping paper, bill of lading, waybill, dangerous cargo manifest, or other shipping document, used in lieu of the original manifest, to fulfill the record-keeping requirement of § 250.33 of Subpart C.

(5) "EPA" means the U.S. Environmental Protection Agency.

(6) "EPA Region" means the States and territories found in any one of the following ten regions:

Region I—Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island.

Region II—New York, New Jersey, Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

Region III—Pennsylvania, Delaware, Maryland, West Virginia, Virginia, and the District of Columbia.

Region IV—Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, and Florida.

Region V—Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio.

Region VI—New Mexico, Oklahoma, Arkansas, Louisiana, and Texas.

Region VII—Nebraska, Kansas, Missouri, and Iowa.

Region VIII—Montana, Wyoming, North Dakota, South Dakota, Utah, and Colorado.

Region IX—California, Nevada, Arizona, Hawaii, Guam, American Samoa, Commonwealth of the Northern Mariana Islands.

Region X—Washington, Oregon, Idaho, and Alaska.

(7) "Farm" means a piece of land on which crops or animals are raised.

(8) "Farmer" means a person whose principal business is operating a farm.

(9) "Generator" means any person or Federal Agency whose act or process produces hazardous waste identified or listed under Subpart A; provided, however, that certain producers may or may not be generators depending on whether they meet the criteria specified in § 250.29 of this Subpart.

(10) "Hazardous waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in Subpart A.

(11) "Household refuse" means trash or rubbish ordinarily produced by a family at their home.

(12) "Identification code" means the unique code assigned by EPA to each generator, transporter, a treatment, storage, or disposal facility, pursuant to regulations published in § 250.24 herein and Subpart G.

(13) "International shipment" means the transportation of hazardous waste between a generator located in the United States and a treatment, storage, or disposal facility located outside the jurisdiction of the United States.

(14) "Interregional shipment" means the transportation of hazardous waste between EPA regions.

(15) "Intraregional shipment" means the transportation of hazardous waste within an EPA Region.

(16) "Manifest" has the meaning given in Section 1004(12) of the Act as further defined and specified in § 250.22 herein.

(17) "Manifest document number" means the serially increasing number assigned to the manifest or delivery document by the generator for record-keeping and reporting purposes.

(18) "On-site" means on the same or geographically contiguous property. Two or more pieces of property which are geographically contiguous and are divided by public or private right(s)-of-way are considered a single site.

(19) "Package" or "outside package" means a packaging plus its contents.

(20) "Packaging" means the assembly of one or more containers and any other components necessary to assure compliance with the minimum packaging requirements under 49 CFR 173, 178, and 179 and includes containers (other than freight containers or over-packs), portable tanks, cargo tanks, tank cars and multi-unit tank car tanks.

(21) "Permitted hazardous waste management facility" or "permitted facility" means a hazardous waste treatment, storage, or disposal facility that has received an EPA permit in accordance with the requirements of Subpart E of this Part or a permit from a State agency authorized in accordance with Subpart F of this Part.

(22) "Regional Administrator" means one of the Regional Administrators of the United States Environmental Protection Agency or his designee.

(23) "Reporting quarter" means the three (3) month time period covered by each quarterly report; the reporting quarters end on the last day of March, June, September, and December.

(24) "Reporting year" means the twelve month time period covered by each annual report; the reporting year ends on the last day of September.

(25) "Retailer" means a person engaged solely in the business of selling directly to the consumer.

(26) "Spill" means any unplanned release or discharge of a hazardous waste onto or into the air, land, or water.

(27) "Storage tank" means any manufactured nonportable covered device used for containing but not treating hazardous waste.

(28) "Triple rinsed" refers to containers which have been flushed three times, each time using a volume of diluent at least equal to ten percent of the containers capacity.



(29) "United States" means the 50 States, District of Columbia, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

#### § 250.22 Manifest.

(a) Any generator who meets the criteria of § 250.20(c), (1), (i), (ii), or (iv) shall prepare a manifest before shipping the hazardous waste.

(b) The manifest shall consist of at least an original and three copies and shall be signed by both the generator and the transporter.

(c) The generator shall retain at least one copy of the manifest and shall give the transporter at least the original and two copies of the manifest. Within one week of an international shipment of hazardous waste, the generator shall send a copy of the manifest to the appropriate regulatory agency of the foreign country having jurisdiction over the designated facility.

(d) The generator shall maintain on file a copy of each manifest retained in accordance with § 250.2(c) above until the original manifest or delivery document is received from the treatment, storage or disposal facility or until three years after the date of shipment of the hazardous waste, whichever occurs first.

(e) The generator shall retain the original copies of the manifests or delivery documents that he receives from the operators of the treatment, storage, or disposal facilities to which the hazardous waste is shipped. These original copies shall be maintained on file until three years after the date of shipment of the hazardous waste.

**NOTE.**—The original manifest or delivery document will be signed by an authorized agent of the treatment, storage, or disposal facility and returned to the generator pursuant to a requirement in § 250.43-5 of Subpart D of this Part.

(f) A single manifest may be used for multiple shipments of hazardous waste during any one day provided that:

(1) All requirements of this Section are met;

(2) The shipments are from the same generator, transported by the same transporter, and designated to the same permitted facility during any one day;

(3) The waste has the same shipping description and hazard class;

(4) The quantity of waste of each individual shipment is specified; and

(5) Each individual shipment and quantity is acknowledged by the initials of an authorized representative of the generator and the transporter.

(g) The generator shall make all originals and copies of manifests and delivery documents maintained on file,

pursuant to § 250.22(d) and (e), accessible to and available for inspection by any official or employee authorized by the Administrator.

(h) The manifest shall contain the following information (see Figure 1 for the sample manifest format):

(1) A manifest document number;

(2) The generator's (or generators') identification code(s), name(s), address(es), and the date of shipment;

(3) The identification code(s), name(s), and address(es), of the transporter(s);

(4) The identification code(s), name(s), and address(es), of the permitted facility(ies). For international shipments of hazardous waste, only the name and address of the foreign treatment, storage, or disposal facility is required on the manifest;

(5) The name and common code of the hazardous waste (under the column "SHIPPING DESCRIPTION"). In naming a hazardous waste, a generator shall:

(i) Use the Department of Transportation (DOT) proper shipping name (identified in 49 CFR 172);

(ii) If the DOT proper shipping name is "NOT OTHERWISE SPECIFIED" (NOS), the EPA name (identified in § 250.14, of Subpart A) shall also be used after the DOT proper shipping name NOS;

(iii) If no EPA name exists, then, only the DOT proper shipping name NOS shall be used on the manifest.

(6) The hazard class of each waste. In naming the hazard class, a generator shall:

(i) Use the DOT hazard class (identified in 49 CFR 172);

(ii) If the DOT hazard class is "OTHER REGULATED MATERIALS" (ORM), the EPA characteristic or property (identified in § 250.13 or 250.14 of Subpart A of this Part) shall also be used after the DOT hazard class (ORM);

(7) The quantity of each hazardous waste; by units of volume or weight in pounds (P), tons (T), gallons (G), or cubic yards (CY);

(8) Directions as to what immediate action should be taken regarding a spill or a 24-hour telephone number or numbers where information on how to handle a spill can be obtained;

(9) The statement "in the event of a spill contact the National Response Center, U.S. Coast Guard, 800-424-8802 for emergency assistance;"

(10) When available, special handling instructions;

(11) When appropriate, additional comments; and

(12) The following certification: "This is to certify that the above-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the appli-

cable regulations of the Department of Transportation and the U.S. Environmental Protection Agency." The information on the manifest or delivery document shall be certified by having an authorized representative of the generator sign and date it.

#### § 250.23 Reporting.

(a) Any generator who meets the criteria of § 250.20(c)(1) (i) or (iv) shall:

(1) Prepare, after the closing date of each reporting quarter, a quarterly report of shipment of all hazardous waste to treatment, storage, or disposal facilities which originated during the reporting quarter but for which the original manifest or delivery document from the treatment, storage, or disposal facility has not been received pursuant to § 250.43-5 of Subpart D of this Part. The quarterly report shall also list all international shipments of hazardous waste made during the preceding quarter.

(2) Prepare, after the closing date of each reporting year, an annual report of shipments of all hazardous waste originated during the reporting year to treatment, storage, or disposal facilities;

**NOTE.**—The quarterly reports are exception reports listing shipments of hazardous waste for which receipt by the treatment, storage, or disposal facility has not been documented by return of the original manifest or delivery document from the facility. However, in any one quarter a generator with no outstanding manifests or delivery documents of hazardous waste and no international shipments, need not prepare or submit a quarterly exceptions report.

(3) Submit, within 30 days after the closing date of the reporting quarter or year, a single copy of each quarterly and/or annual report for the quarter or year just ended to the EPA Regional Administrator for the Region in which the generator is located.

(b) Each annual report required by § 250.23(a) shall contain the following information (see Figure 2 for the sample generator report form):

(1) The generator's identification code, name, and address;

(2) The closing date of the annual reporting period;

(3) The identification code of each permitted facility to which a hazardous waste has been sent; or the name and address of the foreign treatment, storage, or disposal facility;

(4) The name and common code of each hazardous waste appearing on the manifest or delivery document under "SHIPPING DESCRIPTION" which was treated, stored, or disposed of at a permitted facility;

(5) The total quantity of each hazardous waste;

(6) The units of volume or weight of each shipment quantity; in pounds

(P), tons (T), gallons (G), or cubic yards (CY);

(7) A list of transporters whose services were used during the annual reporting period;

(8) When appropriate, additional comments; and

(9) The following certification: "I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." The information on the report shall be certified by having an authorized representative of the generator sign and date it.

(c) Each quarterly report for exceptions and international shipments required by § 250.23(a) shall contain the following information (see Figure 2 for the sample generator report form):

(1) The generator's identification code, name, and address;

(2) The closing date of the quarterly reporting period;

(3) Under the column titled "TREATMENT, STORAGE, OR DISPOSAL FACILITY I.D. CODE" shall be:

(i) The letters "NR" for hazardous waste shipments where the original manifest or delivery document has not been returned to the generator followed by the identification code of the facility, or;

(ii) The letter "I" if the shipment was international, followed by the name and address of the foreign treatment, storage, or disposal facility to which the hazardous waste has been sent.

(4) The manifest document number, followed by the date of shipment to the treatment, storage, or disposal facility;

(5) The name and common code of each hazardous waste appearing on the manifest under "SHIPPING DESCRIPTION";

(6) The total quantity of each hazardous waste;

(7) The units of volume or weight of each quantity; in pounds (P), tons (T), gallons (G), or cubic yards (CY); and

(8) Under "COMMENTS", a short description of efforts made by the generator to trace the whereabouts of the missing hazardous waste and/or manifest. (Not applicable to international shipments.)

(9) The following certification: "I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility

of fine and imprisonment." The information on the report shall be certified by having an authorized representative of the generator sign and date it.

(d) Any generator of a hazardous waste who meets the criteria of § 250.20(c)(1)(iii) shall:

(1) Prepare, after the close of each reporting year, an annual report of all hazardous waste generated and treated, stored, or disposed on-site during the reporting year;

(2) Submit, within 30 days after the closing date of the reporting year, a single copy of the annual report for the year just ended to the EPA Regional Administrator for the Region in which the generator is located.

(e) Each annual report required by § 250.23(d) above shall contain the following information (See Figure 2 for the sample generator report form):

(1) The generator's identification code, name, and address;

(2) The closing date of the annual reporting period;

(3) The word "on-site" under the column titled "TREATMENT, STORAGE, OR DISPOSAL FACILITY I.D. CODE";

(4) The name and common code of each hazardous waste handled on-site (under "SHIPPING DESCRIPTION"), as described in § 250.22(h)(5) of this Subpart;

(5) The hazard class of each waste, as described in § 250.22(h)(6) of this Subpart;

(6) The total quantity of each type of hazardous waste generated;

(7) The units of volume or weight of each quantity, as described in § 250.22(h)(7) of this Subpart;

(8) Under "COMMENTS," the method of treatment, storage, or disposal for each waste, and

(9) The following certification: "I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." The information on the report shall be certified by having an authorized representative of the generator sign and date it.

(f) Any transporter regulated under Subpart C of this Part or any owner or operator of a treatment, storage, or disposal facility regulated under Subparts D and E of this Part who assumes a generator's duties with respect to waste oil pursuant to § 250.28 shall:

(1) Prepare, after the closing date of each reporting quarter, a quarterly report based on the information designated on the manifest or delivery document for shipments of waste oil sent during the reporting quarter to a

treatment, storage, or disposal facility but for which the original manifests or delivery documents have not been received; the quarterly report also must list all international shipments of waste oil. No quarterly report is required for intraregional or interregional shipments of waste oil if all waste shipments are received by the treatment, storage, or disposal facility. Receipt of a shipment is defined by the return of the original of the manifest or delivery document to the person who assumes the generator's duties, signed by an authorized agent of the treatment, storage, or disposal facility.

(2) Prepare, after the closing date of each reporting year, an annual report for intraregional or interregional shipments of waste oil based on the information designated on the manifests or delivery documents which were dated for shipment during the reporting year;

(3) Submit, within 30 days after the closing date of the reporting quarter or year, a single copy of each quarterly and/or annual report for the quarter or year just ended to the EPA Regional Administrator with regulatory authority over the person who assumes the generator's duties.

(g) Any transporter regulated under Subpart C of this Part or any owner or operator of a treatment, storage, or disposal facility regulated under Subparts D and E of this Part who assumes the generator's duties under this Subpart for waste oil shall designate in the annual report (See Figure 2 for the sample generator report form):

(1) The transporter's or the owner's or operator's identification code, name, and address in lieu of the generator's;

(2) The closing date of the annual reporting period;

(3) The identification code of each hazardous waste treatment, storage, or disposal facility to which waste oil has been sent;

(4) The identification code of each generator whose duty was assumed during the reporting year under the column titled "MANIFEST DOCUMENT NUMBER";

(5) The name "waste oil" and common code under the column titled "SHIPPED DESCRIPTION";

(6) The total quantity of waste oil received from the generator and treated, stored, or disposed of at a permitted facility;

(7) The units of volume or weight of the total quantity in pounds (P), tons (T), gallons (G), or cubic yards (CY);

(8) When appropriate, additional comments; and

(9) The following certification: "I have personally examined and am familiar with the information submitted

in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." The information on the report shall be certified by having an authorized representative sign and date it.

(h) Any transporter or any owner or operator of a permitted facility who assumes the generator's duties for waste oil must designate in the quarterly report for waste oil shipment(s) not received by a treatment, storage, or disposal facility, or for international shipment(s) of waste oil (See Figure 2 for the sample generator report form):

(1) The transporter's or the owner's or operator's permitted facility identification code (if applicable), name, and address in lieu of the generator's;

(2) The closing date of the quarterly reporting period;

(3) The letters "NR" for waste oil shipments for which the original of the manifest signed by the designated facility has not been received followed by the identification code of that permitted facility, or the letter "I" if the shipment was international followed by the name and address of the treatment, storage, or disposal facility to which the waste oil has been sent;

(4) The manifest document number, followed by the date of shipment to the treatment, storage, or disposal facility;

(5) The name "waste oil" and common code under the column titled "SHIPPING DESCRIPTION";

(6) The total quantity of waste oil shipped;

(7) The units of volume or weight of the total quantity in pounds (P), tons (T), gallons (G), or cubic yards (CY);

(8) When appropriate, additional comments; and

(9) The following certification: "I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." The information on the report shall be certified by having an authorized representative sign and date it.

§ 250.24 Identification codes.

Every generator shall apply to EPA for an identification code in accordance with the procedures under §§ 250.822 and 250.823 in Subpart G of this Part before commencing hazardous waste generation activities.

§ 250.25 Containers.

(a) Every generator shall place the hazardous waste to be shipped:

(1) In packages in accordance with the Department of Transportation regulations on packaging under 49 CFR 173, 178, and 179. If no specific packaging is required, the generator shall place the hazardous waste in a package in accordance with the Department of Transportation regulations on standard requirements for all packages in 49 CFR 173.24 (a), (b), and (c) (2)-(9); or

(2) In a permanent storage tank that complies with the requirements of § 250.44-1 of Subpart D of this Part.

§ 250.26 Labeling practices.

(a) Every generator shall label and placard each shipment of hazardous waste in accordance with the Department of Transportation regulations on hazardous materials, 49 CFR 172.

(b) Every generator shall label and mark each package of hazardous waste in accordance with the Department of Transportation regulations on labeling and marking, 40 CFR 172, and § 250.22(h)(5) of this Subpart.

(c) Every generator shall mark each package of hazardous waste using the following words:

"CONTROLLED WASTE"—Federal Law Prohibits Improper Disposal.  
Generator I.D. Code \_\_\_\_\_  
Manifest Document Number \_\_\_\_\_

The generator's identification code and the manifest document number(s) shall appear in the space following the words "Generator I.D. Code" and "Manifest Document Number," respectively. The marking shall use the same color(s), approximate dimension(s), and material(s) used to make markings required by § 250.26(b) of this Subpart.

§ 250.27 Confidential information and presumption.

(a) All information provided in connection with the manifest and reporting sections established by this Subpart shall be available to any person to the extent and in the manner authorized by Section 3007(b) of the Act, the Freedom of Information Act (FOIA) (5 U.S.C. Section 552), and the EPA Regulations adopted in compliance with the FOIA (40 CFR Part 2).

(b) In all civil enforcement proceedings brought under the Act where it has been established that a person generates hazardous waste, as identified or listed in Subpart A of this Part, there shall be a rebuttable presumption that the person's act or process produced and disposed more than 100 kilograms of hazardous waste during the time period specified in the enforcement proceeding.

§ 250.28 Waste oil assumption of duties contract.

(a) If a generator of waste oil enters into an Assumption of Duties Contract

with a transporter governed by Subpart C of this Part or a treater, storer, or disposer governed by Subparts D and E of this Part, the transporter (or treater, storer, or disposer) shall become independently liable for performance of the duties assumed by him under this Subpart.

(b) Each generator entering into such a contract must keep a signed copy of it as a permanent record during the time the contract is in effect and for a period of one year following its termination.

(c) The Assumption of Duties Contract must state in writing that in exchange for valuable consideration the transporter (or treater, storer, or disposer) will perform all or part of the duties contained in this Subpart. If less than all of the duties are assumed, the contract must specify which duties are not assumed.

(d) The Contract must be signed by authorized representatives of the parties.

§ 250.29 Persons who dispose of less than 100 kilograms per month of hazardous waste; retailers; and farmers.

(a) Any person who produces and disposes of no more than 100 kilograms (approximately 220 pounds) of hazardous waste in any one month period, or any retailer disposing of hazardous waste (other than waste oil), is not a generator provided that the hazardous waste:

(1) Is disposed of in an on-site or off-site solid waste disposal facility in a State with an approved State plan under Subtitle D of the Solid Waste Disposal Act, as amended, which facility has been permitted or otherwise certified by the State as meeting the criteria adopted pursuant to Section 4004 of the Act; or (2) Is shipped to and treated, stored, or disposed of in a facility permitted by the Administrator pursuant to the requirements of Subpart E of this Part or permitted by an authorized State program pursuant to Subpart F of this Part.

(b) A farmer disposing of hazardous waste is not a generator provided he:

(1) Disposes of all waste pesticide in accordance with instructions on the pesticide label or, in the absence of label instructions, disposes of the pesticide in accordance with procedures and criteria specified in 40 CFR Parts 165 and 257, and

(2) Triple rinses each pesticide container after it has been emptied and uses the rinsate as make-up water in the tank mix or, at an application rate consistent with pesticide labeling, on crop lands; provided, however, that the pesticide must be registered for the particular crops and such application must be consistent with the criteria established in 40 CFR Part 257; and;

(3) Disposes of all other hazardous wastes in accordance with § 250.29(a) (1) or (2) above.



Figure 1

HAZARDOUS WASTE MANIFEST				MANIFEST DOCUMENT NUMBER							
IDENTIFICATION											
		I.D. CODE	NAME	ADDRESS	DATE SHIPPED OR RECEIVED						
GENERATOR											
TRANSPORTER											
TSD (TREATMENT, STORAGE OR DISPOSAL FACILITY)											
WASTE INFORMATION											
SHIPPING DESCRIPTION	HAZARD CLASS	QUANTITY	UNIT								
EMERGENCY INFORMATION										PHONE NUMBER	
IMMEDIATE RESPONSE INFORMATION											
SPECIAL HANDLING INSTRUCTIONS											
COMMENTS											
CERTIFICATION											
<p><i>This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the U.S. Environmental Protection Agency.</i></p>											
_____ GENERATOR SIGNATURE						_____ DATE					
<p><i>This is to certify acceptance of the hazardous waste shipment.</i></p>											
_____ TRANSPORTER SIGNATURE						_____ DATE					
<p><i>This is to certify acceptance of the hazardous waste for treatment, storage, or disposal</i></p>											
_____ TSD SIGNATURE						_____ DATE					

**SAMPLE**

Figure 2

HAZARDOUS WASTE GENERATOR REPORT				
IDENTIFICATION				
NAME		GENERATOR IDENTIFICATION CODE		
ADDRESS				
		CLOSING DATE		
WASTE INFORMATION				
TREATMENT, STORAGE OR DISPOSAL FACILITY I.D. CODE	MANIFEST DOCUMENT NUMBER	SHIPPING DESCRIPTION	QUANTITY	UNIT OF MEASURE
SAMPLE				
COMMENTS				
CERTIFICATION				
<p>I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."</p>				
SIGNATURE			DATE	

[6560-01-M]

(40 CFR PART 250 SUBPART D)

## SECTION 3004—STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

Section 3004 of RCRA requires the Administrator to promulgate such performance standards for owners and operators of hazardous waste treatment, storage, and disposal facilities (hereinafter sometime referred to as facilities or facility) as may be necessary to protect human health and the environment. These standards must include requirements for site location and design, operating methods, contingency plans, continuity of operation, personnel training, financial responsibility, recordkeeping, reporting, monitoring, inspection, and compliance with the Subpart B manifest system and the Subpart E permit system.

Section 3004 standards not only establish the levels of environmental protection that hazardous waste treatment, storage, and disposal facilities must achieve, they also are the criteria against which EPA officials will measure applications for permits. Facilities which handle waste identified or listed as hazardous under Subpart A must comply with these standards. Facilities on a generator's property as well as those not on his property (hereinafter referred to as off-site facilities) are covered by these regulations and do require permits (under Subpart E), but generators and transporters who do not own or operate facilities for the treatment, storage, or disposal of hazardous waste do not need permits under RCRA.

These facility standards are key provisions in the cradle-to-grave system mandated by RCRA for handling and tracking hazardous waste. The manifest system established in Subpart B regulations comes to a close when manifested hazardous waste is received by a treatment, storage, or disposal facility and notice of receipt is sent to the generator.

In order to facilitate understanding of these rules, much of this preamble discusses the Subpart D standards in the order they appear in the regulation. These standards can best be understood when read along with the Subpart A and Subpart B standards under RCRA which also appear in today's FEDERAL REGISTER and when read in conjunction with the other standards EPA already has proposed under RCRA which are cited in the Summary of today's proposed rules under 40 CFR Part 250. Many issues overlap these regulations.

This preamble summarizes and explains the reasoning behind many of the requirements in this regulation and specifically requests comments on

many issues. Because a requirement in the Subpart D regulation is not highlighted in the preamble, however, does not mean that comments on the requirement are not solicited. Comments are invited on all issues raised in the proposed regulations, this preamble and the documents referenced in the preamble. Comments also are solicited on any issues raised by Section 3004 of RCRA which may not have been addressed in today's FEDERAL REGISTER.

## REGULATORY STRUCTURE

EPA considered three different ways to write standards for hazardous waste treatment, storage, and disposal facilities. Under one approach, EPA would set ambient standards for air and water quality and for other relevant parameters. The Agency would set standards at levels it believes protect human health and the environment. It is not always possible, however, to know why an ambient standard has been exceeded; that is, the source of the pollutant is difficult to determine and to remedy. Consequently, this type of standard is difficult to enforce. Also, it is extremely difficult to gather the data necessary to set safe levels for the thousands of substances that might be found in hazardous waste and to monitor for those substances.

The second type of standard the Agency has considered writing would prescribe design and operating requirements for hazardous waste management activities. Such standards can be enforced, but could tend to hold technology stagnant.

The third type of standard would directly regulate the release of pollutants from a given source, although new technology could be encouraged by this approach because an owner or operator would be free to choose his technology, such standards would be of limited utility because a hazardous waste management site often discharges a variety of pollutants in different forms from several points and so would be very difficult to regulate as a single, given source. As with ambient standards, EPA also would have great difficulty gathering the data to determine the amount of each pollutant that could safely be released into the environment and it also would be difficult and expensive to monitor for each pollutant. EPA decided to combine the strengths of all three types of standards in the Subpart D rules, although the Agency is relying primarily on the second type—design and operating standards.

## DESIGN AND OPERATING STANDARDS

The design and operating standards are divided into four overlapping categories: (1) General facility standards applicable to all hazardous waste treatment, storage, and disposal facilities (with a few readily apparent ex-

ceptions); (2) standards for storage applicable to all facilities which store waste identified as hazardous pursuant to Subpart A (with the exception of facilities where generators properly store waste on-site for 90 days or less before shipment to an off-site treatment, storage, or disposal facility); (3) standards for treatment and disposal facilities categorized by method of treatment or disposal employed; and (4) standards for special waste applicable to waste the Agency has identified as requiring special handling because it is produced in very large quantities, it presents a relatively low level of hazard and it may be unsuitable to be managed by Subpart D control techniques.

The Agency intends that permit writers incorporate all those design and operating standards of Subpart D which are applicable to a given site in each permit they issue. For example, incineration standards will not be inserted in the permit of a facility which only disposes of waste by landfilling, nor will the same monitoring requirements be incorporated in each permit. EPA also intends that State adoption of equivalent or more stringent design and operating standards will be a requirement for EPA approval of a State hazardous waste program under Subpart F. Thus, in most cases, States also will incorporate such standards as conditions in the permits or licenses they issue.

Most of the design and operating standards prescribe very specific requirements with which facilities must comply. The Agency has, however, received comments on the drafts of these regulations that the design and operating standards do not allow enough flexibility to cope with the different design and operating problems facilities face which vary with facility location and the type or types of waste handled. Recognizing that these very specific Subpart D standards might discourage the development of new technologies or that different design and operating requirements might be necessary for a particular facility which is disposing of only one type of waste or waste from only one waste stream, EPA has inserted "Notes" after certain of the design and operating standards. Each Note describes the circumstances in which the Regional Administrator may allow deviation from the specific Subpart D standard to which the Note applies. Generally the Notes authorize the Regional Administrator to allow deviation from a specific requirement when the applicant for a permit demonstrates that an alternate requirement or an existing natural condition at the site will achieve at least an equivalent degree of containment, destruction, or environmental protection as the Subpart

D design or operating requirement. So, for example, § 250.43-2 (Security) requires that a facility have a 6 foot fence completely surrounding it which is capable of preventing the unknowing and unauthorized entry of persons and domestic livestock. The Note, however, states that a facility does not need such a fence if the applicant can demonstrate (at the time the permit is issued) that the facility is surrounded by some other barrier which is capable of accomplishing the same result.

The Note mechanism was chosen over the alternative of more general design and operating standards, and over the alternative of a general variance procedure, because the Agency believes the use of individual Notes best fulfills the Congressional mandate of establishing such performance standards as may be necessary to protect human health and the environment. The Agency could have written more general standards and not used Notes. Going back to the example of the 6 foot fence, EPA might just have established a requirement that the active portion of a facility be surrounded by a barrier capable of preventing the unknowing and unauthorized entry of persons and domestic livestock. Without further guidance, however, it is very likely that such a requirement would receive widely varying interpretations by permit-writers and might well have automatically necessitated an applicant's producing evidence to show that his facility met the standard. Putting the "6 foot" number in the standard, however, both gives a facility owner/operator a very specific requirement he can use to meet the standard and gives both the permit applicant and the Regional Administrator a specific requirement (without the necessity of an additional guidance manual) against which to judge an alternate barrier.

The Agency chose to use the Note mechanism rather than a general variance procedure for two reasons. First, when a Note immediately follows a design and operating standard, the Note can, if necessary, specify exactly the degree of containment, destruction, or environmental protection any alternate requirement must achieve.

Second, using the procedure of individual Notes, the Agency can clearly establish that no deviations from certain requirements are allowed. In the Agency's judgment those requirements not accompanied by Notes must be met, as written, in order to ensure protection of human health and the environment.

Section 3005 of RCRA provides additional flexibility in the permitting system; this section states that permits may contain schedules for modification to bring facilities into compliance with section 3004 standards.

Thus, in addition to the 3-tiered structure of design and operating standards, Notes, and Human Health and Environmental Standards (discussed *infra*), the permitting process will provide extra leeway, particularly for existing facilities.

The procedures governing permit applications, permit issuance, and use of the Notes will be explained in more detail in EPA's proposed Subpart E rules, which the Agency expects to publish in early 1979. EPA is also planning to publish a RCRA enforcement policy at that time which will discuss how the Agency intends to use its authority under Sections 3005(d) and 3008 to enforce these standards.

#### HUMAN HEALTH AND ENVIRONMENTAL STANDARDS

In addition to the design and operating standards, Subpart D contains three overriding standards called Human Health and Environmental Standards; these are designed to provide a fail-safe mechanism for the protection of groundwater, surface water, and air quality.

Section 1006 of RCRA directs EPA to integrate to the maximum extent practicable all provisions of RCRA with appropriate provisions of the other Acts of Congress which give EPA regulatory authority. One of the ways EPA has chosen to integrate RCRA with the Safe Drinking Water Act (SDWA), the Clean Air Act (CAA), and the Clean Water Act (CWA) is through the use of Human Health and Environmental Standards. Each of them—the groundwater, surface water, and air standard—establishes an overriding standard for treatment, storage, and disposal facilities by incorporating relevant limitations established under those acts.

The mandates in the Clean Water Act, the Clean Air Act, and the Safe Drinking Water Act are very close to EPA's mandate in RCRA—protection of human health and the environment. The incorporation of selected SDWA, CWA, and CAA standards not only ensures protection of human health and the environment, but also helps implement the RCRA Section 1006 directive to EPA to integrate and ensure consistency among the Agency's programs.

The Agency believes that this approach of combining overriding Human Health and Environmental Standards with specific design and operating standards (and Notes authorizing deviations therefrom) is the best way to fulfill the Congressional mandate in Section 3004 (to establish such performance standards as may be necessary to protect human health and the environment) and at the same time allow enough flexibility for permit writers to tailor the require-

ments in a permit to the particular circumstances of an individual facility.

Virtually every facility which conforms to the design and operating standards should achieve compliance with the Human Health and Environmental Standards because they are designed to ensure that compliance. The design and operating standards are a specific, certain, easily understood and enforceable set of rules, to the benefit of the regulated community, the States, and EPA. They are based on current state-of-the-art treatment, storage, and disposal practices and we have made the standards as specific and have quantified them as much as the current state-of-the-art allows.

The Agency considered using only design and operating standards, but we believe that no matter how specific and inclusive these standards are, there will nevertheless be a few unusual situations where use of the standards will not achieve the performance they are intended to achieve. Rather than trying to make the design and operating standards much more stringent to try to cover another small marginal group of situations, EPA has chosen to use the override mechanism of the Human Health and Environmental Standards. That is, where the permit writer has reason to believe that the design and operating standards will not achieve compliance with the Human Health and Environmental Standards, the latter will be used to establish more stringent design and operating criteria and the more stringent criteria will be incorporated as enforceable conditions of the permit.

Determining permit conditions using the Human Health and Environmental Standards, however, involves complex cause-and-effect calculations. Thus, the use of the Human Health and Environmental Standards is a less efficient way to implement a hazardous waste management regulatory program, and it provides less certainty for the regulated community as to what constitutes acceptable design and operating practice. Because of those features of the general Human Health and Environmental Standards, the Agency has chosen to rely on design and operating standards, (with accompanying Notes to allow justifiable deviations) as the principal mechanism for assuring the proper management of hazardous waste. Resort to the Human Health and Environmental Standards should be infrequent, but will be necessary to ensure protection of human health and the environment in unusual situations.

#### INTERIM STATUS STANDARDS

The requirements to be imposed on prospective permittees who have interim status pursuant to Section 3005(e) of RCRA presents a special problem.

These prospective permittees, who will have notified EPA of their hazardous waste activities and will have applied for a permit, will be waiting for EPA issuance or denial of a permit. Based on the time-consuming complexity of determining hazardous waste permit requirements, the limited staff that EPA expects to have available to issue permits, and based on the experience that EPA has had with the NPDES permit program under the Clean Water Act, we estimate that completing the issuance of all permits will take several years. Therefore, many prospective permittees will have interim status for an extended period of time. In keeping with the intent of Congress that hazardous waste management be regulated by national standards as quickly as possible, EPA believes that these prospective permittees should comply with selected minimal requirements of the Subpart D standards during interim status.

The Agency does not believe that permit applicants with interim status should be expected to meet all of the Subpart D standards because many of the specific requirements of the design and operating standards may be inappropriate for certain facilities and alternate requirements may be substituted when a permit is issued. Some permittees also may be allowed a reasonable period of time to comply with certain of the Subpart D standards because Section 3005(c) of RCRA provides that EPA (or a State when it is issuing the permit under a program authorized by EPA pursuant to Section 3006) may incorporate schedules for modifications in the permits it issues. Because these determinations are meant to be made in the permit issuance process, where there is full opportunity for public participation, the Agency does not believe it is appropriate to impose all of the Subpart D requirements prior to permit issuance. On the other hand, EPA believes that the prospective permittees should begin to meet certain manifest, record-keeping, monitoring, and other less technical requirements of the Subpart D standards which will definitely be included in the permit without modification and which can help achieve RCRA's goal of protection of human health and the environment. For the same reasons, the prospective permittee also, insofar as possible, should meet the financial responsibility requirements for facility closure and post-closure monitoring and maintenance; some funds then will be available even if the facility is closed prior to issuance of a permit or as a consequence of failure to obtain a permit. Section 250.40 of Subpart D delineates the selected Subpart D standards that are applicable during interim status.

EPA considered making these interim status standards part of the permit application process under Section 3005(b) of RCRA, i.e., having the permit application require an owner or operator to submit information about how he is implementing the interim status standards. EPA would then review the application and assess the owner's or operator's explanation before notifying a prospective permittee that he has fulfilled the requirements for interim status (assuming some such notification by EPA will be provided under Subpart E regulations). The Agency, however, considers that requiring this additional information would impose too great a burden on the regulated community and evaluating the information would impose too great a burden on EPA. We believe that the mandate of RCRA will better be served by having our staff work on issuing and denying permits rather than on making complicated assessments relating to interim status. Comments are requested on all aspects of the Agency's approach to interim status standards.

#### APPLICABILITY OF STANDARDS TO INACTIVE FACILITIES

Neither RCRA nor its legislative history discusses whether the Section 3004 standards for owners and operators of hazardous waste treatment, storage, and disposal facilities apply or were intended to apply to inactive facilities, i.e., those facilities which have ceased receiving, treating, storing and disposing of wastes prior to the effective date of the Subtitle C regulations. This is an important issue, however, because some, and perhaps most, inactive facilities may still be "disposing" of waste within the meaning of that term in Section 1004(3) of RCRA. "Disposal" includes:

the discharge, dumping, spilling, leaking . . . of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

Many inactive facilities may well be leaking solid or hazardous waste into groundwater and thus be "disposing" under RCRA.

RCRA is written in the present tense and its regulatory scheme is organized in a way which seems to contemplate coverage only of those facilities which continue to operate after the effective date of the regulations. The Subpart D standards and Subpart E permitting procedures are not directed at inactive facilities. Enormous technical, legal, and economic problems would arise if these standards were to be directly applied to inactive facilities and all such facilities were required to upgrade. Such an approach

also does not seem equitable because of the enormous difficulty of bringing a closed facility into compliance, and because the present owner of land on which an inactive site is located might have no connection (other than present ownership of the land) with the prior disposal activities.

For those reasons, EPA does not plan to apply Subpart D standards to inactive facilities. The Agency believes that it can more equitably use Section 7003 (Imminent Hazard) of RCRA to bring suit against inactive facilities which pose human health and environmental problems, although this remedy also is available only against the present owner of the land on which an inactive site is located. This section is designed to prevent any imminent and substantial endangerment to human health or the environment from the improper handling, treatment, transportation, storage, or disposal of any solid or hazardous waste. Using Section 7003, EPA can sue the owner of an inactive facility which is discharging a hazardous waste into the air, land, or water and presenting an "imminent and substantial endangerment to health or the environment." Under this procedure, the Agency can seek whatever remedy may be necessary to control the problem. Comments are requested on this policy regarding inactive facilities.

#### APPLICABILITY OF STANDARDS TO EXISTING FACILITIES

EPA recognizes that many existing hazardous waste treatment, storage, and disposal facilities will have difficulty complying with some of these regulations. RCRA requires, however, that all existing facilities be upgraded to the level necessary to provide human health and environmental protection. Section 3005(c) allows the leeway for such upgrading by providing that permits may specify the time allowed to modify a facility to bring it into compliance with Subpart D standards.

One type of solid waste management facility, however, may accept hazardous waste without meeting all of the Subpart D standards and without obtaining a permit. Subpart B regulations provide that retailers, farmers, and persons who produce and dispose of no more than 100 kilograms of hazardous waste per month do not have to comply with all of the Subpart B rules. Section 250.29 provides, however, that those people must dispose of their hazardous waste in a RCRA-permitted hazardous waste facility or in a solid waste disposal facility in a State with an approved State plan under Subtitle D of RCRA, which facility has been permitted or otherwise certified by the State as meeting the criteria adopted pursuant to Section

4004 of RCRA (hereinafter called a "Subtitle D" facility).

EPA does not intend to require Subtitle D facilities which accept hazardous waste only from retainers, farmers, and from persons who produce and dispose of less than 100 kg a month, to obtain permits or to comply with all Subpart D standards. The Agency believes that the Section 4004 criteria will provide a level of protection of human health and the environment sufficient to allow small amounts of hazardous waste to be disposed of in such a facility along with the large amounts of solid waste. Even under worst case assumptions, if the amount of waste allowed under § 250.29 to be disposed of in Subtitle D facilities were to go to such facilities, the Agency calculates that the co-disposal ratio of solid to hazardous waste would not exceed 40:1.

Comments on this approach of allowing Subtitle D facilities to receive small amounts of hazardous waste without meeting Subpart D standards are requested. Comments on alternate approaches also are requested. For example, should Subtitle D facilities be required to meet certain selected Subpart D regulations?

#### GENERAL FACILITY STANDARDS

##### *Site Selection*

Site selection is very important in planning a facility because the potential for damage to human health and the environment is enhanced if a facility is not properly located.

The general site selection standards (§ 250.43-1) prohibit locating a facility in areas where the facility might harm the environment (a wetland, for example) or where the environment might harm the facility (an active fault zone, for example). These standards also apply to existing facilities which may have to modify their operations to comply. If an existing facility cannot be modified to conform to applicable standards, it will have to close.

The Agency has considered writing regulations which would restrict the location of hazardous waste facilities in permafrost (permanently frozen subsoil) areas, which are very fragile ecosystems with significant potential erosion and groundwater contamination problems. However, because permafrost is, for the most part, confined to Alaska, EPA believes that the State of Alaska, rather than the Federal Government, should decide what is feasible and necessary to protect these remote areas in that State. Comment is solicited on the decision not to specifically address permafrost areas in these regulations.

A key issue in site selection is what provision for a site buffer zone should be made. The Agency believes that buffer zones reduce risks to public health and the environment by allowing unexpected discharges or releases from fires, explosions, spills, and underground leaks to be controlled before crossing the property boundary.

These proposed rules require 200 feet between the active portion of a facility and its property boundary line. Comment is requested as to whether 200 feet is an appropriate buffer distance to protect human health and the environment.

Section 250.43-7(c) also relates to site selection. As part of the permit application process, an owner/operator must submit a closure plan which includes a description of possible uses for the land after closure of the facility. The Agency wants to encourage, when possible, the return to another acceptable use of land where hazardous waste facilities have been operated.

##### *Security, Contingency Plan and Emergency Procedures, Training*

After examining its file of damage incidents which have occurred at hazardous waste management facilities, EPA has established standards in these rules for site security, contingency plans, and employee job training. Through such measures, the Agency hopes to eliminate many past causes of human health and environmental damage at hazardous waste facilities. The agency also is preparing a guidance manual on job training which will provide further information in this critical area.

##### *Manifests, Recordkeeping, and Reporting Requirements*

Section 250.43-5 specifies the manifest, recordkeeping, and reporting requirements for hazardous waste facilities. These requirements prescribe the final steps in the manifest system established in Subpart B rules to track hazardous waste from its origin with the generator through its trip with the transporter to its disposition at a treatment, storage, or disposal facility. This system is the heart of RCRA's cradle-to-grave management system for hazardous waste. Owners/operators of facilities which receive waste from off-site must sign and return the original manifest to the generator within 30 days, and must make annual reports to the Regional Administrator summarizing the information on the manifests (i.e., the types and amounts of waste received, source of waste, etc.).

All facility owners/operators are required to keep records of how waste is treated, stored, and disposed of. Such records must include the location of waste in landfills, operating conditions, personnel training, monitoring results, and incidents of damage to human health or the environment. All facility owners/operators must make quarterly reports of certain monitoring data to the EPA Regional Administrator. In addition, all facility owners/operators are required to immediately report damage incidents such as fires, spills, explosions, and problems detected via monitoring to the Regional Administrator. Reporting requirements for on-site facilities are specified in Subpart B.

The Agency believes that the reporting and recordkeeping required by these regulations are necessary to effectively regulate owners/operators of hazardous waste facilities. Much of the information required will be generated by standard business practices and operating procedures. In many instances, standard operating logs can be used to comply with the recordkeeping requirements.

The Agency is considering changing the frequency of monitoring data reporting from quarterly to semi-annually or annually, and also is considering requiring facility owners/operators to return the original manifest to the generator immediately, rather than within 30 days. Comments on these proposals are requested. Comments also are requested on the utility, burden, and practicality of, and need for additional items in, the recordkeeping and reporting requirements.

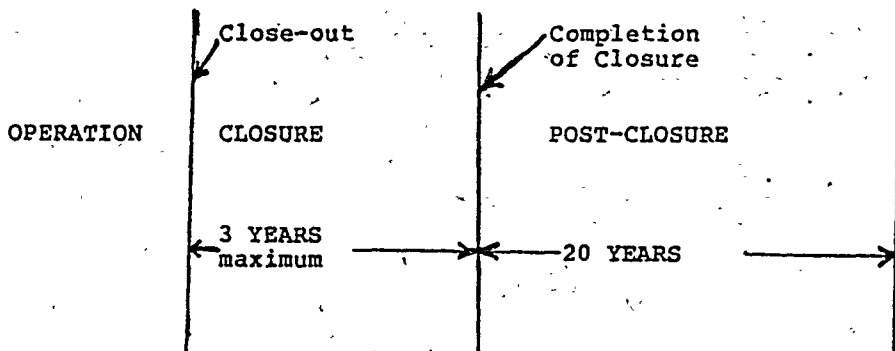
##### *Inspections*

The proposed rules require daily visual inspection of hazardous waste facilities by the owners/operators of these facilities. This requirement is designed to insure that potentially dangerous situations are discovered quickly. Daily visual inspections are considered to be a good management practice which represents a minimum burden to hazardous waste facility owners and operators.

##### *Closure and Post-Closure*

The closure and post-closure standards (§ 250.43-7) specify what facility owners and operators must do after close-out (the time wastes are no longer received for treatment, storage, or disposal). As shown on the diagram below, closure is the period after close-out during which treatment, storage, and disposal operations are completed, final cover is applied to landfills, and equipment is dismantled and decontaminated. This period may not exceed three (3) years.





These proposed regulations require that notice of partial and final closure be given to the Regional Administrator. Such notice allows time for inspection to assure compliance with the standards. Professional certification also is required to provide added assurance that closure operations have been carried out properly. Filing a survey plat is considered necessary to insure that a properly recorded report of facility activities is available for future reference.

Post-closure is the period after closure during which certain monitoring and maintenance must be conducted. The regulations provide that post-closure care shall continue for 20 years. The facility owner or operator may, however, request the Regional Administrator to authorize a reduction or discontinuation of the post-closure requirements before the expiration of 20 years and must produce evidence to support the request. EPA is considering establishing criteria on which the Regional Administrator will base this determination.

Comments are requested on all of the preceding requirements, especially on the periods of time now specified in these proposed rules to complete closure and post-closure activities at hazardous waste facilities.

#### *Groundwater and Leachate Monitoring*

These proposed rules require groundwater and leachate monitoring at all landfills and surface impoundments (§ 250.43-8). Monitoring at landfills is treated separately in § 250.43-5.

The groundwater monitoring requirements specify installation of a minimum of three monitoring wells hydraulically downgradient from the facility and one well upgradient from the facility.

The leachate monitoring requirements specify the installation of Leachate

Monitoring System under the primary liner or natural soil barrier of landfills and surface impoundments. This standard is accompanied by a Note which allows an alternate monitoring system if it is equally capable of detecting a leak. Sampling and analysis is required at regular intervals to determine changes in concentrations of chemical constituents in groundwater and leachate.

The Agency recognizes that the technology of leachate monitoring is still being refined, but the equipment for such monitoring is currently available. EPA considers leachate monitoring extremely important because it can provide an early warning that groundwater contamination may occur. This early warning is crucial because once groundwater contamination has occurred, it is extremely difficult or impossible to remedy, particularly where an aquifer is located far beneath a facility. Groundwater monitoring alone does not sufficiently protect the environment because the leak must move through and cause extensive contamination of the zone of aeration before it reaches and contaminates the groundwater.

EPA is preparing a manual which will provide further guidance on groundwater and leachate monitoring.

#### *Financial Requirements*

*Continuity-of-Operation: Closure.* Hazardous waste facility owners and operators are responsible for closing their sites in accordance with the closure requirements of § 250.43-7. In order to ensure that adequate funds are available for closure when the time comes, the continuity-of-operation standard (§ 250.43-9(a)) requires that an owner/operator establish a trust fund for the amount of the estimated closure cost for the facility; the estimate must be accepted by the Regional Administrator and cash must be deposited before a permit will be issued.

EPA considered allowing owners/operators to post a surety bond rather than requiring them to establish trust funds. The Agency believed that provisions for surety bonds would help offset the financial burden which might occur when a facility owner or operator must deposit the total amount of cash for closure before the permit is granted. However, in conversations with surety brokers, the Agency found that many of the facilities we expected would want to use this method would not be able to qualify for surety bonds. Further, surety bonds are subject to year-to-year renewal and thus do not serve the purpose of providing an assured source of funds for closure. Because closure represents a minor portion of the total cost of operating a hazardous waste management business and because EPA considers the availability of funds to adequately close the site is essential to fully assure the protection of the public health and the environment, the Agency is proposing the establishment of this trust fund as a condition of receiving a permit.

Because the trust fund will be established at the beginning of operations but not used until closure, the interest that will accrue from the fund will be taken into account by the Regional Administrator in determining the fund size. A real interest rate of 2% is used in calculating the present value factor. For example, if an owner or operator estimated at today's prices a cost of \$10,000 for final closure of a site expected to operate for eighteen years, the deposit required would be \$7,000.

*Continuity-of-Operation: Post-Closure Monitoring and Maintenance.* Section 230.43-7 requires each hazardous waste disposal facility owner or operator to maintain the facility security and waste containment devices and monitor for possible leakage for the twenty years following site closure. Post-closure monitoring and maintenance requirements do not apply to treatment or storage facilities because when those facilities close no hazardous waste will remain at such sites.

Each disposal facility owner/operator must estimate the costs of complying with the post-closure regulation when applying for a permit. The estimate will be accepted or revised by the Regional Administrator as part of the permitting activity. To ensure the availability of the necessary funds, EPA is requiring each disposal facility to establish an individual trust fund for post-closure monitoring and maintenance which is to be built up over the life of the site or over twenty

years, whichever is shorter. EPA considered requiring a shorter period for deposit of the needed funds, but the preliminary economic impact work indicated that too short a pay-in period could cause a severe financial burden on a disposal site operator.

Another alternative considered would have required a permit holder to obtain a surety bond for the portion of the estimate that was not yet covered by deposits in the trust fund. As EPA discovered was the case when it examined this option for the closure standard, very few facilities have sufficient assets to obtain surety bonds in the required amounts, nor would surety bonds necessarily be renewed annually.

EPA again has used a real interest rate of 2% to calculate expected growth in the closure and post-closure monitoring and maintenance trust fund. EPA has made this choice on the assumption that nominal interest rates and the rate of inflation will move up and down together (as has been true for long periods of time) and that the rate of increase in real purchasing power of the funds in the trust will therefore remain constant at 2%. The Agency also is assuming that the rate of increase in the costs of the required task (i.e., post-closure monitoring and maintenance) will be the same as the rate of increase of prices in general as it is the latter rate that is reflected in nominal interest rates.

*Financial Responsibility: Site Life Liability.* EPA has interpreted the term financial responsibility in Section 3004 of RCRA to include the ability to pay for injuries to people and property which result from the escape of hazardous waste into the environment. The primary objective of the site life liability standard is to ensure that funds will be available to satisfy legitimate damage claims against a facility during its operating life.

The proposed regulations require a facility to show evidence of a minimum of \$5 million of financial responsibility per occurrence per site for sudden and accidental occurrences during the life of the site. In addition, the owner or operator of a facility, or group of facilities, is required to have and maintain financial responsibility for non-sudden and accidental occurrences in the amount of \$5 million per occurrence, and an annual aggregate of \$10 million, including legal defense costs. Both types of insurance coverage in these amounts are now available from the private sector.

Financial responsibility, which is intended to include claims arising from both sudden and non-sudden escape of hazardous waste to the environment, can be established by liability insurance, self-insurance, a combination of the two, or some other form of finan-

cial responsibility acceptable to the Regional Administrator. If a company elects self-insurance, however, such insurance for all sites owned and insured may not exceed 10 percent of the firm's equity.

The major difficulty the Agency faces in establishing insurance and indemnification levels is the lack of actuarial data on a regulated waste management industry. While it is clear that the Subtitle C regulations will reduce both the number of damage cases and their severity, the degree to which this will occur is open to speculation.

EPA has used its existing damage case data from an unregulated industry to set the financial responsibility requirement, but the data on recent damage incidents do not allow us to compare in dollars the relative hazards posed by different wastes and different treatment, storage, and disposal processes. The dollar value of damage incidents in EPA files ranges from \$100,000 to many millions of dollars. It is not unrealistic to imagine claims of several million dollars against a hazardous waste management facility.

The Agency has attempted to establish with very little actual data and minimal experience with a regulated hazardous waste industry a level of coverage that will provide reasonable protection to the public, but is not prohibitively expensive for many firms. The \$5 million level for financial responsibility will apply to all permitted facilities.

Many of the comments EPA has received on this point during development of these regulations take the position that all hazardous waste management firms do not require this amount of protection. While this may be true, EPA has been unable to identify reliable criteria for determining different levels of financial responsibility for different permit holders.

Comments on how criteria for different levels of financial responsibility could reliably be determined are requested. EPA also requests comments on whether this provision of funds to satisfy damage claims is a legitimate Federal responsibility under RCRA. The Agency believes that such a provision is with the terms of the Act which require us to establish such requirements for financial responsibility "as may be necessary or desirable," but is interested in public reaction to our requiring this kind of financial responsibility.

The Agency also has received comments that such liability insurance is prohibitively expensive. EPA has discussed this point with several insurance industry representatives, has reviewed ranges of premium costs for such liability insurance being written

today, and has concluded that insurance costs are not unreasonable.

*Financial Responsibility: Post-Closure Liability for Hazardous Waste Disposal Facilities.* EPA initially thought that liability insurance would be the best way to provide a post-closure source of funds to satisfy legitimate damage claims against hazardous waste disposal facilities. Most existing liability policies, however, only offer protection against sudden occurrences such as explosions, pipeline ruptures, or abrupt failures of containment vessels during facility operation. The critical insurance protection for post-closure liability is coverage for non-sudden occurrences. Coverage of non-sudden occurrences after facility closure is not readily available. EPA estimates that even if such coverage should become generally available, the premiums would be prohibitive.

Because of the uncertainties associated with long-term disposal of hazardous waste and the unavailability of post-closure non-sudden liability coverage from the private sector, EPA is considering seeking legislative authority to create a Federally administered fund to provide such protection. The fund would be available to satisfy legitimate claims for damage when damage occurs after a hazardous waste disposal facility has closed, but would be established in such a way as to encourage responsible waste management by the owner/operator during facility operation. As now envisioned, the fund would be administered by the Federal Government and financed from a surcharge levied on the disposal of hazardous waste. The fund would be responsible for damage claims and remedial action up to a specified amount per claim. Until the necessary legislative authority is granted by Congress, EPA is reserving proposal of this portion of the regulation.

*Financial Responsibility: Request for Comments.* In addition to the comments requested in the discussion of the various financial responsibility requirements, EPA encourages comment in the following areas:

(1) Are there reasonable alternatives (such as interest bearing accounts in financial institutions) to the "trust fund" mechanism for closure and post-closure financial requirements in the continuity of operation section (§ 250.43-9(a))?

(2) Are there reasonable alternatives to the proposed financial responsibility regulation (§ 250.43-9(b))?

(3) Should site life insurance coverage for non-sudden and sudden events exclude legal defense costs?

(4) Is a Federal fund for post-closure financial responsibility for hazardous waste disposal sites desirable and if so, how should it operate?

(a) What should the size of the fund be?

(b) Should there be a maximum amount available for any one claim; if so, what amount?

(c) What amount should be charged per unit of waste disposed?

(d) How should the fund be administered?

(e) What are the alternatives to a Federally administered fund?

(f) Should the fund provide separate regulations for publicly owned and privately owned facilities?

Further, the Agency is considering, and solicits comments on additional closure and post-closure financial responsibility provisions designed to insure that adequate funds are available for closure and post-closure care. To that end, a system of periodic checks would be established. The closure and post-closure financial responsibility provisions would require the facility to biannually re-evaluate and revise the estimate of the amount of total and annual payments necessary to provide adequate financing for closure and post-closure care. A report of the re-evaluation and revision would be included in the annual report required to be submitted to the Regional Administrator. The evaluation and revision would be subject to the approval of the Regional Administrator. In addition, the provisions would require the owner/operator to certify in the annual report that he has made the required annual payments to the trust funds.

#### STANDARDS FOR STORAGE

The storage standards proposed in § 250.44 are intended to prevent the release of hazardous waste from storage areas into the environment. Section 1004(33) of RCRA defines "storage" as the containment of hazardous waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal of hazardous waste. Section 1004(3) of RCRA defines "disposal" as

the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

Because "storage" cannot constitute "disposal," the regulations for hazardous waste storage operations require that storage be conducted in such a manner that no discharge or release of any waste occurs.

An issue central to the storage standards is when storage begins. The Agency believes that it would be inappropriate to require generators to comply with Subpart D storage regulations the instant a waste is generated

because they really are not storage facility operators. However, the Agency also recognizes that generators tend to accumulate considerable quantities of hazardous waste over extended periods of time. With prolonged storage, the Agency believes the generator does become a storage facility operator, with the attendant environmental risks, and should have to comply with the storage regulations.

The Agency has decided to allow generators a reasonable period of time to accumulate hazardous waste on-site (with the intent to ship off-site) within which time they will not be considered storage facility operators. Ninety days has been selected as this interim period, as EPA considers that the likelihood of discharge of waste to the environment occurring within 90 days is low. Accordingly, a storage facility is defined as any facility that stores hazardous waste, except a facility used by a generator to store his own hazardous waste on-site in DOT specification containers for less than 90 days for subsequent transport off-site.

In order to prevent the release of waste to the environment, the standards for storage (§ 240.44) include the requirement that storage tanks and containers be of sturdy and leakproof construction. The Occupational Safety and Health Administration (OSHA) has written explicit design specifications for tanks and containers used to store flammable and combustible liquids (29 CFR 1910, Subpart H, § 1910.106). EPA proposes to require that facility owners/operators store all of their hazardous waste in tanks and containers which meet the specifications in OSHA's regulations for flammable and combustible liquid containers. OSHA's specifications are designed to ensure that no discharge from containers meeting those specifications will occur. Subpart D standards go beyond OSHA specifications, however, by providing that storage tanks and containers must be constructed of materials which are compatible with the hazardous waste to be contained or must be protected by a liner compatible with the waste to be contained. Comments are requested on this proposal to adopt OSHA's specifications for storage containers.

#### STANDARDS FOR TREATMENT/DISPOSAL

Section 250.45 prohibits treatment or disposal of certain kinds of waste in landfills, surface impoundments, basins, or landfarms unless the owner/operator can demonstrate that such treatment or disposal will not exceed OSHA's permissible contaminant levels for any listed airborne contaminants (29 CFR § 1910.1000) above such non-point sources and that it will not contribute two or more airborne contaminants to the air in a manner

which will cause a specified equation to exceed unity. EPA believes that this prohibition is justified because reactive, ignitable, and volatile waste pose special treatment and disposal problems. The Agency does not know of any way to ensure protection of human health and the environment without imposing this prohibition and attendant Note requirement. Comments on this approach are requested.

Air sampling at non-point sources (e.g., surface impoundments, landfills) is not required in these regulations. Sampling at a non-point source may be made a permit condition, however, in a situation such as this, where the owner/operator is authorized to deviate from a design and operating standard. Air sampling procedures for non-point sources are under development. A manual will be provided by EPA following promulgation of these rules to describe the procedures by which air sampling at non-point sources could be accomplished.

#### Incineration

The standards in § 250.45-1 apply to hazardous waste incinerators which are defined as combustion devices. One example of an incinerator is a rotary kiln. These regulations also apply to cement kilns, utility boilers, and any other devices which burn hazardous waste by combustion.

The Subpart D performance standards for the incineration of hazardous waste prescribe conditions for destruction of the waste introduced and for control of the resulting emissions. Thus, these proposed rules include specifications on residence time, combustion temperature, excess air, combustion efficiency, scrubber efficiency, and automatic feed cutoffs. Trial burns are required for incinerators burning waste of a type which has not previously been burned in similar incinerators. The results of trial burns must be submitted to the Regional Administrator. Additionally, an emission standard for particulates is given.

EPA sponsored a program to assess processes for destroying chemical waste in commercial scale incinerators, as well as programs to destroy chemical waste in experimental incineration units. EPA has concluded that thermal destruction as a method of treatment of primarily organic chemical waste is both technically feasible and environmentally sound.

The successful utilization of certain cement kilns for destruction of chlorinated organic waste is one of the more important results of EPA's program. Cement kilns use the halogen content of the waste to reduce alkalinity in the cement clinker while using the hydrocarbons as fuel. The BTU value of waste reduces the fuel otherwise required to produce cement. Com-

bustion conditions in the kiln are more rigorous than those in incinerators designed solely for hazardous waste disposal. Thus, the combustion conditions are usually more than adequate for the destruction of halogenated and non-halogenated hydrocarbon fuels, including PCBs.

EPA has received comments that incineration should not be so strictly regulated that already costly incineration facilities become more so. EPA believes that because incineration has been found to be technically feasible and environmentally sound, and because it reduces or eliminates the volume and/or toxicity of waste to be land disposed, it should be actively encouraged.

Comments are requested on all of the regulations prescribed for incineration, particularly the standards for which explicit limiting values are proposed. These include 99 percent halogen removal in emission control systems, 99.9 percent combustion efficiency, 99.99 percent destruction efficiency, 1000° C combustion zone temperature, two-second retention time, 0.08 grains per dry standard cubic foot stack concentration limit for particulates, and the monitoring requirements.

#### Landfills

The Agency recognizes that the state-of-the-art for predicting discharges or releases from landfills is poor and thus believes that the only option available to ensure protection of human health and the environment is to prescribe design and operating standards which will provide maximum containment in landfills; that is what these standards are designed to do. The Notes accompanying the landfill standards allow the substitution of alternate standards if the permit applicant can demonstrate to the Regional Administrator that the alternative will provide equivalent or better performance than the specified standard.

Maximizing containment minimizes the escape of hazardous waste constituents. Although EPA recognizes that some escape of waste constituents conceivably may not present a hazard to the environment, the Agency is not aware of any method for designing landfills to allow specific constituent release rates, nor is the Agency aware of any method to determine what release rates would be acceptable. The Agency also cannot predict how long hazardous waste in a landfill will remain hazardous. Accordingly, the only viable alternative the Agency sees to fulfill its Section 3004 mandate to protect human health and the environment is to require that landfills be designed, constructed, and operated so

that discharges are minimized or do not occur.

The landfill designs in these proposed standards are separated into two categories; different designs are required for different natural geologic and climatic conditions at the selected site. Where site conditions allow, i.e., at those sites which have extensive homogeneous clay deposits and where the evaporation rate exceeds precipitation by at least 20 inches per year, the landfill design must include 10 feet of natural in-place soil with a permeability of  $<1 \times 10^{-7}$  cm/sec. as a liner. No leachate collection is necessary at such sites, provided that a "bathtub" situation is not expected to occur, i.e., provided that liquids would not accumulate in the landfill to the extent that they overflow to the surface or create leaks to the groundwater due to excessive hydraulic head.

Two alternate landfill designs are suggested where the geology and climate of the site location do not allow the use of the design just discussed. Both of these latter designs utilize a liner system(s) in conjunction with leachate collection. The decision of which design to use is entirely up to the owner/operator. Design I consists of a leachate collection and removal system on top of a soil liner or natural soil or mantle barrier at least 5 feet thick with a permeability not greater than  $1 \times 10^{-7}$  cm/sec. Design II is a more complex design involving a double liner, leachate collection and removal, and a leachate detection and removal system. The double liner consists of a soil liner (3 feet thick with a permeability of  $<1 \times 10^{-7}$  cm/sec.) overlying a synthetic membrane ( $>20$  mils thickness with a permeability of  $<1 \times 10^{-7}$  cm/sec.). The leachate collection and removal system must be placed on top of the soil liner to collect and remove leachate generated in the fill. A leachate detection and removal system must be located beneath the synthetic bottom liner. The top soil liner will provide primary containment of the waste and protection for the synthetic membrane liner. The synthetic liner will provide containment of any waste which migrates or leaks through the soil liner. The Agency feels there is, at present, inadequate information available on the long-term reliability of synthetic liners, used by themselves, for waste containment in landfills. Therefore, Design II provides a bottom leachate detection and removal system to ensure complete containment of waste and leachate. The presence of such a bottom leachate detection and removal system also makes unnecessary the need for leachate (zone of aeration) monitoring under the Landfill, and prevents the possibility of groundwater contacting the bottom of the

landfill due to the pumping mechanisms inherent in the leachate detection and removal system.

Discouraging the landfilling of liquid hazardous waste is another key element of EPA's strategy for maximizing the containment of waste in landfills. It is important to understand that the regulations do not categorically ban liquids from landfills. Rather, they require that liquids be modified and/or treated to a non-flowing consistency prior to landfilling or *in situ*. The Agency feels it is important to discourage the landfilling of liquid hazardous waste because such waste increases the likelihood that hazardous materials will enter the environment. The hydraulic head created by liquids is the driving force which causes landfills to leak. The Agency wants to prevent hydraulic head from being created; thus, these standards emphasize leachate collection and require that liquids be modified before landfilling.

Comments are requested on all of the regulations for land filling hazardous waste, particularly the standards for which explicit limiting values are proposed. These include the 1.5 meter (5 foot) separation between the bottom of the liner system(s) or natural in-place soil or mantle barrier and the water table, the 150 meter (500 foot) separation from any functioning public or private water supply, the 20 mil minimum thickness and  $1 \times 10^{-12}$  cm/sec. or less permeability of synthetic membrane liners, the design specifications for landfill construction, the criteria for soil liners and natural impermeable soil barriers, the minimum capacity for leachate collection sumps, and the final cover specifications.

#### Basins and Surface Impoundments

For the purpose of these regulations, a "basin" is any uncovered above-ground device constructed of artificial materials which is used to retain hazardous waste as part of a treatment process. Basins usually have a capacity of less than 100,000 gallons. Examples of basins are open mixing tanks, clarifiers, and settling tanks. In comparison, surface impoundments, which may serve the same purpose, are any natural topographic depressions, artificial excavations, or dike arrangements which: (1) Are used primarily for holding, treatment, or disposal of waste; (2) may be constructed above, below, or partially in the ground or in navigable waters (e.g., wetlands), and (3) may or may not have a permeable bottom and/or sides.

Although basins are a subset of surface impoundments and both may serve the same purposes, i.e., containment of hazardous waste for treatment or retention, the difference in

construction and the attendant environmental problems associated with each require that they be subject to different standards in certain areas. Compare §250.45-3 standards with §250.45-4 standards.

Surface impoundments usually are built by constructing earth dikes around the impoundment area. They are usually lined, either with soil (natural in-place soil or reworked/reconstructed soil) or synthetic materials. Liners and dikes are the primary barriers to movement of hazardous waste from the impoundment. The surface impoundment regulations primarily are concerned with ensuring the impermeability, structural stability, and integrity of dikes, soil barriers, and synthetic liners.

In comparison, basins are usually constructed entirely above ground from materials such as concrete or steel. The construction material(s) serves as the primary barrier to movement of waste from such structures. Basins may be lined or unlined, but basin liners serve only to protect against corrosion of, or waste incompatibility with, construction materials. Because of the materials used and the above-ground construction of basins and because they generally are small, most corrosion problems, cracks, or other damage to them that can lead to hazardous waste migration or seepage can be detected through visual inspection. Surface impoundments however, which usually are at least partially underground and which use liners and dikes for containment must be subject to different standards in order to protect groundwater and surface water as hazardous waste constituent migration from surface impoundments usually cannot be detected visually.

Another reason basins are subject to different standards is that they are temporary structures and thus Subpart D standards require that they be removed or decontaminated at facility closure. In comparison, some surface impoundments could be used for permanent disposal of hazardous waste. If they are used for permanent disposal, they must be designed, constructed, and closed according to §250.45-2 landfill regulations. Even if not used for permanent containment, however, they still must be closed pursuant to specifications which are different than those for basin closure.

#### *Landfarming*

Landfarming is an environmentally acceptable method for treating and disposing of some hazardous waste, provided certain operating and design parameters are used. Section 250.45-5 of these proposed rules contains standards for landfarming which EPA believes will protect human health and the environment.

Certain types of waste generally should not be landfarmed. Excessive volatilization, i.e., vaporization, of a hazardous waste, for example, releases contaminants to the air. Therefore, hazardous waste with a vapor pressure exceeding 78 mm Hg at 25°C generally should not be landfarmed. However, the Agency recognizes that it may be possible to safely landfarm hazardous waste with vapor pressures exceeding 78 mm Hg using special methods such as subsurface soil injection, so an exception to this general prohibition is provided. A note accompanying the standard allows volatile wastes to be landfarmed provided the facility owner/operator demonstrates that such a practice will not violate permissible airborne contaminant levels.

Environmentally persistent organics ideally should not be landfarmed in such concentrations that they could not be degraded fairly quickly. However, landfarming of this class of waste is not specifically banned by the regulations because of the difficulty in defining the term "environmentally persistent organics." Such a definition logically should include either a finite half-life or finite time that it takes such substances to be degraded to harmless by-products. Degradation, however, includes reactions of a chemical, biological, and/or photochemical nature. Degradation is dependent on many factors, including the concentration of the compound in the soil, and the definition may need to include this parameter in order to protect human health and the environment. EPA does not have the data needed to make such a definition at this time. Comment is requested on the subject of defining environmentally persistent organics. For example, should we shift the burden to the owner/operator to show that an organic applied in a certain concentration will be degraded within a certain amount of time?

The regulations require that landfarms be located on areas of fine grained soil types (OH, CH, MH, CL, and OL) as defined by the Unified Soil Classification System. These soils were selected for their favorable waste attenuating characteristics. The potential for attenuation is based on surface area per unit weight and silt/clay/colloid composition. Use of alternate soil types is allowed, provided they prevent vertical migration of hazardous constituents. Comment is requested concerning the appropriateness of specifying soil types and the suitability of the soils specified. Suggestions on alternate (or additional) soil types and soil classification systems, with appropriate supporting data, are solicited.

The landfarming regulations require extensive soil monitoring to detect and

provide time for preventing the migration of hazardous waste below the zone of incorporation, i.e., the depth to which the soil on a landfarm is plowed or tilled to receive waste. Because soil monitoring will detect migration long before groundwater is threatened, groundwater monitoring is not required. The Agency also is not requiring groundwater monitoring because we are not aware of any documented case of groundwater pollution resulting from hazardous waste landfarming. The Agency requests comment on whether groundwater monitoring is desirable at landfarms, and if so, why.

Soil conditions at a landfarm are determined by soil monitoring. Soil monitoring consists of taking core samples, sample analysis, and statistical comparison of analytical results to previously established background soil conditions. The soil monitoring regulations require one soil core per acre semi-annually. The depth of the core is three times the depth of the zone of incorporation. The bottom one-third of the soil core is quantitatively analyzed to determine if there is a significant increase, above background, in the concentration of constituents that make the waste hazardous. A significant increase over background is considered unacceptable and remedial actions are required. Comments are requested on all aspects of the soil monitoring requirements. Specific information is needed on the adequacy, statistical or otherwise, of the number, depth, and frequency of soil cores required. Suggestions for alternate approaches are requested, e.g., a formula for the number of cores to be taken per unit area, based on landfarm size and representative soil types. Specific information and suggestions are also requested for the purpose of defining, via statistical methods, "significant increase above background." The information submitted should reflect dependence of the defining statistical method on the method developed for determining the number of soil cores to be taken per unit area.

One objective of these proposed rules on landfarming is to prevent the conversion of huge tracts of productive land to land with limited potential for future use. Comments on whether this is a reasonable Federal objective under RCRA are requested. Meeting this objective requires that the soil of the treated area(s) of a landfarm be returned to it previously existing (i.e., pre-landfarming) condition when landfarming operations cease. New facilities will utilize soil monitoring background data developed prior to beginning operation for this purpose. Existing facilities must use the background soil conditions of similar local soils as the basis for comparison unless site



data exist that establish background conditions for the soil of the treated area(s) prior to any waste application.

The soil in a landfarm functions as a filter medium which, when subject to application of waste containing non-degradable contaminants, eventually becomes loaded with such contaminants, especially heavy metals. Left unattended, the contaminants of the soil-filter medium will eventually be carried away by surface run-off, or will migrate to groundwater due to natural changes in physical and chemical soil parameters. Therefore, the contaminated soil-filter medium, if it would be considered a hazardous waste under Subpart A, must either be decontaminated or disposed of as a hazardous waste. Comments are requested, though, on whether under certain specified circumstances the soil-filter medium could be left as it is at the end of operations without the potential for human health or environmental damage.

Growth of food chain crops upon hazardous waste landfarms is prohibited. The purpose of this prohibition is to protect against human consumption of toxic materials that may adhere to or be taken up by such crops. The Agency recognizes, however, that certain hazardous waste probably could be safely applied to land on which food chain crops are grown if certain management practices are employed. For example, for waste similar to sewage sludge from publicly owned treatment works, EPA may be able to develop management controls (control of application rates, soil/waste pH, etc.) similar to those we are currently developing for such sludges under Section 4004 of this Act and Section 405 of the Clean Water Act which will ensure protection of human health.

EPA has considerable data on the effect that POTW sewage sludge has on food crops and thus we can develop rules for landfarming POTW sludge which will allow growth of food chain crops on such land but, the Agency has little or no information on the effects of other types of sludge on food crops. Given the possibility of high levels of toxic constituents in the hazardous waste that might be landfarmed under these regulations, the absence of adequate information on crop uptake of the contaminants in these wastes, and the lack of data on management control that would be necessary to allow growth of food crops, the Agency deems a general prohibition on the growth of food crops on such land warranted. Comments and data are requested that would assist the Agency in developing regulations that would provide for the controlled application of hazardous waste to food chain croplands.

#### *Chemical, Physical, and Biological Treatment Facilities*

The section of the proposed Subpart D standards which specifically addresses chemical, physical, and biological treatment facilities (§ 250.45-6) deserves special emphasis. Treatment is defined in Section 1004(34) of RCRA to include any process designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste, render it nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume.

Although this section in the regulation is relatively short, it covers a large and important facet of hazardous waste management. The Agency prefers chemical, physical, and biological treatment rather than disposal techniques such as landfilling as a means of waste management because such treatment can detoxify a waste and thus reduce the potential for human health or environmental damage. Treatment also reduces the burden that present practices place on future resources.

The reason why these standards are not extensive is that treatment techniques vary widely and thus it is very difficult to write design and operating standards which apply to all possible chemical, physical, and biological treatment systems. Furthermore, the Agency wants to allow flexibility so that owners and operators of treatment facilities can match treatment processes with waste types. Treatment processes should be tailored to fit the individual requirements of the facility and hazardous waste being handled. The advantages of writing standards which allow a facility operator to tailor his processes to the waste being handled are that such standards allow flexibility in the construction of treatment facilities thereby encouraging design innovations, and they encourage treatment by not regulating it extensively.

If in treating hazardous waste, facilities produce residues which are not hazardous according to Subpart A standards, such residues are not subject to Subtitle C regulations. Thus, the treatment facility would be subject to Subtitle C regulations and need a permit because it is treating hazardous waste, but any non-hazardous residuals such as chemically fixed waste, or neutralized acid or alkaline waste, do not have to be handled at a permitted facility, nor do they need a manifest if shipped offsite. One example of a residue which may be non-hazardous is the ash from a hazardous waste incinerator.

#### *Commercial products*

EPA knows of several instances where waste which is likely to be hazardous under Subpart A rules is being used to make commercial products. Hazardous waste can be used, for example, to make soil conditioners and fertilizers, fuel oil, and construction products. EPA believes it must regulate hazardous waste which is used to make commercial products when such regulation appears necessary to protect human health and the environment. Except for radioactive special waste, there currently are no Subpart D standards covering commercial products made from hazardous waste. The Agency has, however, considered and is continuing to consider developing standards for such reuse of hazardous waste. We believe such protection probably could best be achieved by imposing standards on product quality control.

One approach the Agency has considered is to require that any product made from hazardous waste not pose a threat to human health or the environment greater than the threat posed by the virgin product it replaces. Commercial products made from a hazardous waste which met this criterion which then cease being hazardous waste for purposes of Subtitle C of RCRA and thus would no longer be subject to Subtitle C regulations. There are probably other viable approaches as well.

Comments on feasible regulatory approaches for commercial products made from a hazardous waste are requested. In addition, the Agency requests any data that are available which we might use to support future standards in this area.

#### *SPECIAL WASTE STANDARDS*

In the course of preparing Subtitle C regulations under RCRA, the Agency realized that some portions of certain very large volume wastes will be hazardous under Subpart A standards and thus will come within the purview of the Subtitle C regulatory scheme. These wastes are cement kiln dust, utility waste (fly ash, bottom ash, and scrubber sludge), phosphate mining and processing waste, uranium and other mining waste, and gas and oil drilling muds and oil production brines.

The Agency has very little information on the composition, characteristics, and the degree of hazard posed by these wastes, nor does the Agency yet have data on the effectiveness of current or potential waste management technologies or the technical or economic practicability of imposing the Subpart D standards on facilities managing such waste.

The limited information the Agency does have indicates that such waste



## PROPOSED RULES

occurs in very large volumes, that the potential hazards posed by the waste are relatively low, and that the waste generally is not amendable to the control techniques developed in Subpart D. The Agency is calling such high-volume hazardous waste "special waste" and is proposing to regulate it with special standards.

The following table provides some information about those wastes which, when hazardous, the Agency proposes

to regulate with special standards. With two exceptions, EPA does not know how much of the total amount of waste generated in these categories is, in fact, hazardous and thus subject to Subtitle C regulations. Only waste which is hazardous under Subpart A standards, however, is "special waste" under this Subpart. Any portion of the waste on the following table which is not hazardous under Subpart A standards is not regulated at all under Subtitle C and thus is not "special waste."

<i>Special Waste</i>		
[Metric tons/yr]		
Waste	Quantity	Possible hazard
Cement Kiln Dust.....	12 million*	Alkalinity and heavy metals
Utility Waste (fly ash, bottom ash, scrubber sludge).....	66 million*	Heavy metals (trace)
Phosphate Mining, Beneficiation, and Processing Waste.....	400 million.....	Radioactivity (low levels)
Uranium Mining.....	150 million.....	Radioactivity
Other Mining Waste.....	~2 billion*	Heavy metals, acidity
Gas and Oil Drilling Muds and Oil Production Brines.....	5 million*	Alkalinity, heavy metals, toxic organics, salinity

NOTE.—It is not yet known how much of the total quantity of waste marked with an asterisk (\*) is, in fact, hazardous waste.

A proposed rulemaking will be published at a later date regarding the treatment, storage, and disposal of special waste. The Agency will be developing additional information in order to write substantive standards for special waste, and hereby solicits information and comment from the public which may assist the Agency in developing its proposals. For the time being, all facilities which handle special waste will be exempted from the storage standards (§ 250.44) and the treatment and disposal standards (§ 250.45). In order to provide some protection from special waste and to collect additional information on special waste streams, EPA has prepared special standards for each type of special waste. Many of the general facility standards in § 250.43 are prescribed for special waste. In addition, some special waste must meet standards which are designed to control potential problems unique to that waste.

#### *Dredge Spoils*

Certain dredge spoils may prove to be hazardous and thus subject to these regulations. The Agency has little information regarding hazard levels and potential threats to human health and the environment associated with on-land disposal of these wastes. Information on acceptable waste management techniques and associated economics is also limited. Therefore, EPA is considering designating dredge spoils as a special waste under Section 250.46,

thus deferring most requirements pending further study. As an alternative, the agency is considering exempting these wastes from RCRA requirements and covering them solely via regulation under section 404 of the Clean Water Act. Comments on how these wastes should be managed are invited.

#### *Infectious Waste*

EPA has received comments from the U.S. Army Environmental Hygiene Agency (USAEHA) that infectious waste defined as a hazardous waste pursuant to Subpart A should be considered a special waste and allowed to be disposed of at a landfill facility which does not meet all of the Subpart D landfill standards. USAEHA also suggested that certain infectious waste could be adequately managed at facilities that meet the Section 4004 "Criteria for Classification of Solid Waste Disposal Facilities" proposed under Subtitle D of RCRA (43 FR 4914). The U.S. Army Environmental Hygiene Agency agrees, however, that certain infectious waste, because of the extreme hazard associated with it, should go to facilities with a demonstrated capability to manage such waste.

EPA believes the above proposal has some merit, and is considering various administrative and regulatory options which we could employ to accomplish it. Consideration is being given to designating all or certain categories of in-

fectious waste which is hazardous under Subpart A as "special waste." The Agency would then write different Subpart D regulations for such infectious waste.

The Agency invites comments from the public on this issue.

#### OPERATING AND DESIGN MANUALS AND INDUSTRY-SPECIFIC MANUALS

To assist with the implementation of these regulations, the Agency is preparing a number of detailed manuals.

The operating and design manuals will provide much more detailed information on waste management technologies than that given in the regulations. The manuals will cover acceptable practices for different types of treatment, storage, and disposal facilities, including landfills, landfarms, storage facilities, incinerators, chemical, physical, and biological treatment facilities, and surface impoundments. Manuals on monitoring and training also are being developed. These manuals will be organized to correspond closely with the regulations, but will be guidance manuals with no regulatory effect. The Agency expects to issue the manuals prior to final promulgation of the Subtitle C regulations.

The industry-specific guidance manuals will help various industries understand how the regulations apply to them. They will be issued as concise brochures. Sample diagrams and terms meaningful to the particular industry will be used. Eventually, manuals will be prepared for all major industrial categories. Initially, though, these manuals will be prepared for industries comprised primarily of small companies which can least afford to devote much effort toward understanding these regulations. The first industry-specific guidance manuals are being prepared for the electroplating and battery manufacturing industries.

#### OTHER ISSUES

##### *Definition of Aquifer*

As defined in § 250.41, an aquifer means any water-bearing stratum or unit which, due to its ability to store and transmit water, is capable of yielding a useable quantity of groundwater to a well or spring. The key concept in this definition is "a useable quantity of groundwater." EPA has received many inquiries about how one determines a useable quantity. EPA, at this time, has not decided on what basis to make this determination (it could, for example, be 600 gal/day which is enough for a single household of 4 people) since relatively low yield aquifers can still be useable in certain

circumstances. Comment is requested on the current definition of aquifer, specifically on how the Agency should define a "useable quantity" of water.

#### *Test of Significance*

The term "significant" or "significantly" as used in these proposed rules has not always been defined in quantitative terms. A statistical test or tests to quantitatively define "significant" will be developed where the Agency believes it is necessary and will be cited or referenced where appropriate in the final rules. One method specified in these rules is the use of Student's t-test.

Comment and information from the public regarding appropriate statistical methods or tests to apply in these regulations where the term "significant" is used, but no quantification is made would be appreciated.

#### INTEGRATION WITH OTHER ACTS

##### *Underground Injection and Ocean Disposal*

The disposal of hazardous waste by underground injection and ocean disposal is not covered by these proposed rules where these activities are regulated under the Safe Drinking Water Act (SDWA), and the Marine Protection, Research, and Sanctuaries Act (MPRSA). Most underground injection facilities, however, involve above-ground storage of waste prior to injection. Some of these facilities will have to comply with both the Subpart D (RCRA) standards and the Underground Injection Control (UIC) regulations to be promulgated under the SDWA. The UIC regulations also will include closure procedures for underground injection wells. Similarly, most ocean disposal operations involve on-shore facilities which must comply with the Subpart D (RCRA) standards.

##### *NPDES Permitted Facilities*

These proposed rules apply to owners/operators of all treatment, storage, and disposal facilities which receive hazardous waste. Accordingly, they may apply to some National Pollutant Discharge Elimination System (NPDES) permitted facilities, such as publicly or industrially owned waste water treatment plants which handle hazardous waste. The regulatory considerations for publicly owned facilities differ from those for industrially owned facilities, and accordingly are discussed separately below.

These hazardous waste control regulations apply only to the transport of hazardous waste directly by truck or rail to publicly owned treatment works (POTW). Once a hazardous waste, transported to a POTW, has been mixed with sewage, the resulting mix-

ture is no longer considered a solid waste under RCRA. However, the General Pretreatment Regulations (43 FR 27736, June 26, 1978) and the specific pretreatment standards (40 CFR Chapter I, Subchapter N) regulate these materials prior to their introduction by industry into the municipal system, during transport to the publicly owned treatment works, and their treatment and disposal at the treatment works. The pretreatment requirements apply regardless of whether the materials are discharged into municipal sewers or are transported by truck or rail to the publicly owned treatment works. Therefore, these proposed hazardous waste rules are in addition to the pretreatment requirements and only apply to the handling of hazardous waste during delivery to a POTW by truck or rail and before it is mixed with sewage.

Industrially owned waste water treatment plants which discharge directly to surface waters are currently permitted under the NPDES program. These NPDES permits apply only to surface discharges to navigable waters. Since these facilities frequently involve surface impoundments which receive and treat hazardous waste, the possibility exists for subsurface discharges and/or air emissions which are harmful to human health and the environment. Thus, if these impoundments receive hazardous waste, as defined in Subpart A, these facilities are subject to these proposed rules in addition to the current NPDES program. (It should be noted that any hazardous waste (sludge) generated by such industrial wastewater treatment plants, is also subject to these regulations.)

Similarly, industrially owned wastewater treatment plants which discharge to publicly owned treatment works are currently regulated by pretreatment standards. Where these facilities involve surface impoundments for hazardous waste, as defined in Subpart A, such facilities are subject to these proposed rules in addition to the pretreatment standards.

Several commenters to previous drafts of these proposed rules have expressed concern that it is inappropriate to apply RCRA Subtitle C technical and other standards to hazardous waste impoundments in an industrial wastewater treatment train subject to pretreatment standards and/or a NPDES permit, especially for existing impoundments which show no signs of leaching to groundwater or of emissions to the air. In response to these comments, it should be noted that these proposed rules allow the owner/operator of any existing hazardous waste impoundment which does not meet all the design and operating standards to show that such an im-

poundment provides the same or greater degree of performance (e.g., containment) as an impoundment which meets the standards. Thus, if an owner/operator of an existing hazardous waste impoundment can show by monitoring and other means that the impoundment does not leak or exceed air emission requirements, that impoundment may be issued a permit even if it does not meet all the design and operating standards specified herein. The Agency solicits comment on this point with respect to existing hazardous waste impoundments.

##### *Integration with BAT/Pretreatment Standards*

Best Available Technology (BAT) toxic effluent guidelines and pretreatment standards are being developed for specific industries under the Clean Water Act during the same time frame as these proposed rules. The Agency may review the Subpart D facility standards on a case-by-case basis for those industries for which BAT and pretreatment standards are being developed in order to ensure that the two programs together provide the greatest environmental protection. Such evaluation would include consideration of compliance costs. At present, however, the proposed regulations apply to all industries, except as specified in § 250.46.

##### *Clean Air Act*

Owners and operators of hazardous waste management facilities must comply with all applicable standards promulgated under the Clean Air Act. Where applicable, new source performance standards for industrial incinerators promulgated under Section 111 of the Clean Air Act supersede emission standards for hazardous waste incineration established in these Subpart D rules.

##### *Toxic Substances Control Act*

Final rules regarding disposal and marking requirements for polychlorinated biphenyls (PCB's) were promulgated on February 17, 1978, pursuant to Section 6(e) of the Toxic Substances Control Act (TSCA). Those rules are intended to protect the environment from further contamination resulting from improper handling and disposal of PCB's.

The Agency is now considering various options for the integration of the Subpart D standards and TSCA rules for disposal of PCB's and other special chemicals. The options with respect to integration of the PCB regulations with the Subpart D standards are:

- (1) Publish two sets of rules which are totally independent;
- (2) Specify that the PCB rules supersede the Subpart D regulations in areas of overlap;

(3) Amend the PCB rules to make them identical with the Subpart D standards in areas of overlap. Administer the two rules jointly, citing both authorities (TSCA and RCRA);

(4) Merge the PCB rules with the Subpart D standards and co-promulgate them;

(5) Specify that Subpart D regulations are independent of the PCB rules, but integrate the permitting process.

The Agency's current position is that the PCB disposal rules should be merged with the Subpart D regulations and co-promulgated (Option 4). This will allow integrated implementation via RCRA permits and EPA/State hazardous waste programs.

Similar options were considered for other specific toxic chemical disposal regulations which could be promulgated under either TSCA or RCRA authority. The Agency's current plan is to amend Subpart D regulations when necessary in the future when the Agency believes that special requirements in addition to the Subpart D design and operating standards are necessary in order for a specific toxic chemical waste to be properly disposed of.

The Agency requests comment on the above options, and the position taken by the Agency with respect to this issue.

#### COMPLIANCE AND PENALTIES

Failure to comply with these regulations or with permit conditions may result in civil and/or criminal penalties of as much as \$25,000 a day for each day of violation, as specified in Section 3008 of the Act. A facility owner and/or operator must comply fully with all applicable regulations in order to receive a permit under Subpart E or the permit must contain a compliance schedule for modifying the facility to conform to the Subpart D standards.

#### BACKGROUND DOCUMENTS

Twenty-seven (27) background documents have been developed to support these proposed rules. All of these documents are in draft form, and are subject to change as new data and information are received. These background documents basically correspond to each section of the proposed rules. Copies of these documents will be available for review in the EPA Regional Office libraries and the EPA library reading room, Room 2404, Waterside Mall, 401 "M" Street, S.W., Washington, D.C. Comments on these documents are invited.

A list of these background documents is as follows:

(1) Groundwater Human Health and Environmental Standard

(2) Surface Water Human Health and Environmental Standard

(3) Air Human Health and Environmental Standard

(4) General Facility Standards

(5) General Site Selection

(6) Security

(7) Contingency Plan and Emergency Procedures

(8) Training

(9) Manifest System, Recordkeeping and Reporting

(10) Visual Inspections

(11) Closure and Post-Closure

(12) Groundwater and Leachate Monitoring

(13) Financial Requirements

(14) Standards for Storage

(15) Standards for Treatment/Disposal

(16) Incineration

(17) Landfills

(18) Surface Impoundments

(19) Basins

(20) Landfarms

(21) Chemical, Physical, and Biological Treatment Facilities

(22) Cement Kiln Dust Waste

(23) Utility Waste

(24) Phosphate Rock Mining, Beneficiation, and Processing Waste

(25) Uranium Mining Waste

(26) Other Mining Waste

(27) Gas and Oil Drilling Muds and Oil Production Brines

#### *Economic, Environmental, and Regulatory Impacts*

In accordance with Executive Orders 11821, as amended by Executive Order 11949, and OMB Circular A-107, EPA policy as stipulated in 39 FR 37419, October 21, 1974, and Executive Order 12044, respectively, analyses of the economic, environmental, and regulatory impacts are being performed for the entirety of Subtitle C, Hazardous Waste Management. Drafts of these analyses have been completed and will be available for review by January 8, 1979, in the EPA Regional Office libraries and the EPA library reading room, Room 2404, Waterside Mall, 401 M Street, S.W., Washington, D.C. Final versions of these documents will be issued at the time of promulgation.

Dated: December 11, 1978.

DOUGLAS M. COSTLE,  
*Administrator.*

It is proposed to amend Title 40, CFR, Part 250 by adding a new Subpart D consisting of §§ 250.40-250.46; Subpart E consisting of § 250.50; and Subpart F consisting of § 250.60 as follows:

#### PART 250—HAZARDOUS WASTE GUIDELINES AND REGULATIONS

##### Subpart D—Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

###### Sec.

250.40 Purpose, scope, and applicability.

250.41 Definitions.

250.42 Human health and environmental standards.

250.42-1 Groundwater human health and environmental standard.

250.42-2 Surface water human health and environmental standard.

250.42-3 Air human health and environmental standard.

250.43 General facility standards.

250.43-1 General site selection.

250.43-2 Security.

250.43-3 Contingency plan and emergency procedures.

250.43-4 Training.

250.43-5 Manifest system, recordkeeping, and reporting.

250.43-6 Visual inspections.

250.43-7 Closure and post-closure.

250.43-8 Groundwater and leachate monitoring.

250.43-9 Financial requirements.

250.44 Standards for storage.

250.44-1 Storage tanks.

250.44-2 Containers.

250.45 Standards for treatment/disposal.

250.45-1 Incineration.

250.45-2 Landfills.

250.45-3 Surface impoundments.

250.45-4 Basins.

250.45-5 Landfarms

250.45-6 Chemical, physical, and biological treatment facilities.

250.46 Special waste standards.

250.46-1 Cement kiln dust waste.

250.46-2 Utility waste.

250.46-3 Phosphate rock mining, beneficiation, and processing waste.

250.46-4 Uranium mining waste.

250.46-5 Other mining waste.

250.46-6 Gas and oil drilling muds and oil production brines.

FIGURE 1—Treatment, storage, and disposal facility (TSDF) report.

APPENDIX I—Incompatible waste.

APPENDIX II—EPA interim primary and proposed secondary drinking water standards

APPENDIX III—Permissible exposure levels for airborne contaminants.

APPENDIX IV—Methods for determining soil pH.

##### Subpart E—Permits for Treatment, Storage, or Disposal of Hazardous Waste

250.50 Reference.

##### Subpart F—Guidelines for Authorized State Hazardous Waste Programs

250.60 Reference.

AUTHORITY: Secs. 1006, 2002(a), 3004, 3005, and 3006, Pub. L. 94-580, 90 Stat. 2802, 2804, 2807 (42 U.S.C. 6905, 6912, 6924), 2808 (42 U.S.C. 6925), and 2809 (42 U.S.C. 6926).

##### Subpart D—Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

§ 250.40 Purpose, scope, and applicability.

(a) The purpose of the requirements in this Subpart is to establish mini-

minimum national standards defining acceptable hazardous management practices applicable to owners and operators of facilities which treat, store, and dispose of hazardous waste.

(b) In order to receive EPA approval under Subpart F (State Program Requirements), a State must demonstrate that its program contains standards that are equivalent in degree of control to, and at least as stringent as, the standards contained in this Subpart. However, even where a State program is approved, EPA retains independent authority to enforce the requirements in this Subpart pursuant to Section 3008 of the Act.

(c) Except as otherwise provided in this paragraph, an owner/operator of a facility that stores, treats, and/or disposes of hazardous waste shall comply with all of the applicable requirements of §§ 250.42, 250.43, 250.44, and 250.45 unless he is in compliance with a current and effective permit issued by EPA pursuant to Subpart E.

(1) An owner/operator of a facility that treats, stores, and/or disposes of any of the special wastes covered by § 250.46 shall comply with the applicable requirements of § 250.46 with respect to the special waste.

(2) During the period of interim status, as identified in Section 3005 of the Act, an owner/operator of a facility that treats, stores, and/or disposes of hazardous waste shall, at a minimum, comply with the following requirements, as applicable, for active portions of the facility:

(i) Security requirements under § 250.43-2;

(ii) Contingency Plan and Emergency Procedures requirements under § 250.43-3;

(iii) Training requirements under § 250.43-4;

(iv) Manifest System, Recordkeeping, and Reporting requirements under § 250.43-5;

(v) Visual Inspection requirements under § 250.43-6;

(vi) Closure and Post-Closure requirements under § 250.43-7 (a, b, d, e, f, g, h, j, k, l, and m);

(vii) Groundwater and Leachate Monitoring requirements under § 250.43-8 (c) and (d), where a facility has a groundwater and/or leachate monitoring system in place.

(viii) Financial Requirements in lieu of § 250.43-9 as follows:

(A) On the effective date of these regulations, each owner/operator of a facility receiving hazardous waste shall provide a cash deposit equal to the entire amount of the estimated closure costs of the facility in a trust fund designated "in trust for closure of (facility name)". Upon granting of a permit under Subpart E, this fund will be incorporated into the required fund under § 250.43-9(a)(1)(ii). Any excess

shall be refunded at that time. Should closure occur prior to permitting under Subpart E, upon completion of all closure requirements provided under this section, any excess funds shall be reimbursed to the owner/operator upon written concurrence by the Regional Administrator.

(B) On the effective date of these regulations, each owner/operator of a disposal facility receiving hazardous waste shall estimate the cost of complying with the post-closure monitoring and maintenance requirements under § 250.43-7, and shall establish a fund in accordance with this estimate in the same manner as is prescribed in § 250.43-9(a)(2)(ii). Upon granting of a permit under Subpart E, this fund will be incorporated into the fund required under § 250.43-9(a)(2)(ii) and the payment rates thereon shall be adjusted as may be appropriate. Should closure occur prior to permitting under Subpart E, reimbursement of post-closure costs shall be in accordance with § 250.43-9(a)(2)(iii).

(C) Regulations under § 250.43-9(a)(3) shall apply during interim status.

(D) If the owner/operator can demonstrate that full compliance with the closure and post-closure financial responsibility requirements of paragraphs (A) and (B) above would render the facility owner/operator insolvent, the Regional Administrator may consider the financial status of the facility to be a mitigating factor, and may enter into a written agreement with the owner/operator for partial compliance with the financial responsibility requirements of this section.

(ix) Standards for Storage requirements under § 250.44(b), (h), and (i).

(x) Storage Container requirements under § 250.44-2(a), (b), (d), (f), and (g).

(xi) Standards for Treatment/Disposal requirements under § 250.45(a) and (b).

(xii) Landfill requirements under § 250.45-2(b) (3, 4, and 5), (c), and (d).

(xiii) Surface Impoundment requirements under § 250.45-3(d) (3, 5, and 6), and (e).

(xiv) Basin requirements under § 250.45-4(h).

(xv) Landfarm requirements under § 250.45-5 (g), and

(xvi) Chemical, Physical, and Biological Treatment Facilities requirements under § 250.45-6(f).

(3) Owners/operators of publicly owned treatment works (POTW) which receive hazardous waste by truck or rail are exempt from all requirements of this Subpart except the requirements of § 250.43-5(a).

(4) Except as otherwise provided in paragraphs (3) and (5), every facility owner/operator shall apply to EPA for an identification code before com-

mencing hazardous waste treatment, storage, or disposal activities in accordance with the procedures of §§ 250.822 and 250.823 in Subpart G.

(5) An owner/operator of a solid waste management facility which only receives hazardous waste from persons subject to § 250.29 in Subpart B is exempt from the requirements of this Subpart.

(6) An owner/operator (1) of any facility treating, storing, or disposing of solid waste which receives waste which is not manifested under Subpart B of this Part, and is not certified under Subpart C as coming from generators covered by § 250.29, and is in a quantity greater than 100 kilograms, and (2) who knows or has reason to believe that the waste is or may be hazardous shall report to the Regional Administrator the names, addresses and identification numbers (if known) of the generator and the transporter of the waste.

(d) The Regional Administrator shall use the requirements of this Subpart as the basis for:

(1) Assessing the equivalency of a State hazardous waste program in making determinations to approve such programs pursuant to Subpart F, and

(2) Issuing, reissuing or revising permits pursuant to Subpart E.

(i) The Regional Administrator shall incorporate each of the applicable requirements of §§ 250.43, 250.44, and 250.45 as conditions in each permit except:

(A) where the Regional Administrator determines that the requirements will not achieve compliance with the requirements of § 250.42, in which case, the Regional Administrator shall substitute and incorporate in the permit more stringent requirements which will achieve compliance with the requirements of § 250.42, or

(B) where the Regional Administrator substitutes and incorporates an alternative requirement in the permit in accordance with paragraph (ii).

(ii) The Regional Administrator may substitute and incorporate an alternative requirement in the permit only if the alternative requirement:

(A) Is authorized by a note immediately following the requirement for which it is to be substituted, and

(B) Provides the same or greater degree of performance as the requirement for which it is to be substituted pursuant to criteria prescribed in the note.

(iii) For permits that the Regional Administrator has issued, he shall use the requirements of this Subpart as a basis for reopening permits for revision and reissuance in accordance with Subpart E, where he has evidence showing that compliance with the requirements of this Subpart.

(3) Bringing enforcement actions against a facility that:

- (i) Has a State issued permit or license pursuant to authority under Subpart F, but where there is evidence that compliance with such permit or license will not provide compliance with the standards of this Subpart, or
- (ii) Does not have a permit or a pending permit application.

(e) The requirements contained in these regulations do not apply to the following:

- (1) Solid or dissolved materials in domestic sewage;
- (2) Solid or dissolved materials in irrigation return follows;
- (3) Industrial discharges which are point sources subject to permits under Section 402 of the Clean Water Act;
- (4) Source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended;
- (5) Point source air emissions regulated under the authority of Sections 111 and 112 of the Clean Air Act, as amended;
- (6) The disposal of hazardous waste via underground injection pursuant to Safe Drinking Water Act (SDWA) regulations; or
- (7) The disposal of hazardous waste via ocean disposal pursuant to Marine Protection, Research, and Sanctuaries Act (MPRSA) regulations.

#### § 250.41 Definitions.

(a) When used in this Subpart, the following terms have the meanings given in the Act:

- (1) "Administrator"—Sec. 1004(1)
- (2) "disposal"—Sec. 1004(3)
- (3) "Federal Agency"—Sec. 1004(4)
- (4) "hazardous waste management"—Sec. 1004(7)
- (5) "open dump"—Sec. 1004(14)
- (6) "person"—Sec. 1004(15)
- (7) "resource recovery"—Sec. 1004(22)
- (8) "sanitary landfill"—Sec. 1004(26)
- (9) "sludge"—Sec. 1004(26A)
- (10) "solid waste"—Sec. 1004(27)
- (11) "solid waste management"—Sec. 1004(28)
- (12) "solid waste management facility"—Sec. 1004(29)
- (13) "State"—Sec. 1004(31)
- (14) "storage"—Sec. 1004(33)
- (15) "treatment"—Sec. 1004(34)

(b) Other terms used in this Subpart have the following meanings:

- (1) "Act" means the Resource Conservation and Recovery Act of 1976, Public Law 94-580.
- (2) "Active Fault Zone" means a land area which, according to the weight of the geologic evidence, has a reasonable probability of being affected by movement along a fault to the extent that a hazardous waste facility would be damaged and thereby pose a

threat to human health and the environment.

(3) "Active Portion" means that portion of a facility where treatment, storage, or disposal operations are being conducted. It includes the treated area of a landfarm and the active face of a landfill, but does not include those portions of a facility which have been closed in accordance with the facility closure plan and all applicable closure standards.

(4) "Annular Space" means the space between the bore hole and the casing. A bore hole is the man-made hole in a geological formation for installation of a monitoring well.

(5) "Aquifer" means a geologic formation, group of formations, or part of a formation that is capable of yielding useable quantities of groundwater to wells or springs.

(6) "Attenuation" means any decrease in the maximum concentration or total quantity of an applied chemical or biological constituent in a fixed time or distance traveled resulting from a physical, chemical, and/or biological reaction or transformation occurring in the zone of aeration or zone of saturation.

(7) "Basin" means any uncovered device constructed of artificial materials, used to retain wastes as part of a treatment process, usually with a capacity of less than 100,000 gallons. Examples of basins include open mixing tanks, clarifiers, and open settling tanks.

(8) "Cell" means a portion of waste in a landfill which is isolated horizontally and vertically from other portions of waste in the landfill by means of a soil barrier which meets criteria specified in Section 250.45-2(b) (14).

(9) "Chemical Fixation" means the treatment process involving reactions between the waste and certain chemicals, resulting in solids which encapsulate, immobilize or otherwise tie up hazardous components in the waste so as to minimize the leaching of hazardous components and render the waste nonhazardous or more suitable for disposal.

(10) "Close Out" means the point in time at which facility owners/operators discontinue operation by ceasing to accept hazardous waste for treatment, storage, or disposal.

(11) "Closed Portion" means that portion of a facility which has been closed in accordance with the facility closure plan and all applicable closure requirements in this Subpart.

(12) "Closing Date" means the date which marks the end of a reporting quarter or reporting year.

(13) "Closure" means the act of securing a facility pursuant to the requirements of Section 250.43-7.

(14) "Closure Procedures" means the measures which must be taken to

effect closure in accordance with the requirements of Section 250.43-7 by a facility owner/operator who no longer accepts hazardous waste for treatment, storage, or disposal.

(15) "Coastal High Hazard Area" means the area subject to high velocity waters, including, but not limited to, hurricane wave wash or tsunamis as designated on Flood Insurance Rate Maps (FIRM) as zone VI-30.

(16) "Combustion Zone" means that portion of the internal capacity of an incinerator where the gas temperatures of the materials being burned are within 100°C of the specified operating temperature.

(17) "Common Code" means the unique code assigned by the Chemical Abstract Services to each EPA hazardous waste and to each DOT hazardous waste material listed in Section 250.14 of Subpart A.

(18) "Container" means any portable enclosure in which a material can be stored, handled, transported, treated, or disposed.

(19) "Contamination" means the degradation of naturally occurring water, air, or soil quality either directly or indirectly as a result of man's activities.

(20) "Contingency Plan" means an organized, planned, and coordinated course of action to be followed in the event of a fire, explosion, or discharge or release of waste into the environment which has the potential for endangering human health or the environment.

(21) "Cover Material" means soil or other material that is used to cover hazardous waste.

(22) "Delivery Document" means a shipping paper, bill of lading, waybill, dangerous cargo manifest, or other shipping document, used in lieu of the original manifest to fulfill the record-keeping requirement of § 250.33 of Subpart C.

(23) "Direct Contact" means the physical intersection between the lowest part of a facility (e.g., the bottom of a landfill, a surface impoundment liner system or a natural in-place soil barrier, including leachate detection/removal systems) and a water table, a saturated zone, or an underground drinking water source, or between the active portion of a facility and any navigable water.

(24) "Disposal Facility" means any facility which disposes of hazardous waste.

(25) "Endangerment" means the introduction of a substance into groundwater so as to:

- (i) Cause the maximum allowable contaminant levels established in the National Primary Drinking Water standards in effect as of the date of promulgation of this Subpart to be exceeded in the groundwater; or



(ii) Require additional treatment of the groundwater in order not to exceed the maximum contaminant levels established in any promulgated National Primary Drinking Water regulations at the point such water is used for human consumption; or

(iii) Reserved (Note: Upon promulgation of revisions to the Primary Drinking Water Standards and National Secondary Drinking Water Standards under the Safe Drinking Water Act and/or standards for other specific pollutants as may be appropriate).

(26) "EPA" means the U.S. Environmental Protection Agency.

(27) "EPA Region" means the States and other jurisdictions in the ten EPA Regions as follows:

Region I—Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island.

Region II—New York, New Jersey, Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

Region III—Pennsylvania, Delaware, Maryland, West Virginia, Virginia, and the District of Columbia.

Region IV—Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, and Florida.

Region V—Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio.

Region VI—New Mexico, Oklahoma, Arkansas, Louisiana, and Texas.

Region VII—Nebraska, Kansas, Missouri, and Iowa.

Region VIII—Montana, Wyoming, North Dakota, South Dakota, Utah, and Colorado.

Region IX—California, Nevada, Arizona, Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

Region X—Washington, Oregon, Idaho, and Alaska.

(28) "Facility" means any land and appurtenances, thereon and thereto, used for the treatment, storage, and/or disposal of hazardous waste.

(29) "Fertilizer" means any substance containing one or more recognized plant nutrient(s) which is used for its plant nutrient content, and which is designed for use or claimed to have value in promoting plant growth.

(30) "Final Cover" means cover material that is applied upon closure of a landfill and is permanently exposed at the surface.

(31) "Five-Hundred-Year Flood" means a flood that has a 0.2 percent or one in 500 chance of recurring in any year. In any given 500-year interval, such a flood may not occur, or more than one such flood may occur.

(32) "Flash Point" means the minimum temperature at which a liquid or solid gives off sufficient vapor to form an ignitable vapor-air mixture near the surface of the liquid or solid. An ignitable mixture is one that, when ignited, is capable of the initiation and propagation of flame away from the source of ignition. Propagation of

flame means the spread of the flame from layer to layer independent of the source of ignition.

(33) "Food Chain Crops" means tobacco; crops grown for human consumption; or crops grown for pasture, forage or feed grain for animals whose products are consumed by humans.

(34) "Floodplain" means the lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year.

(35) "Freeboard" means the vertical distance between the average maximum level of the surface of waste in a surface impoundment, basin, open tank, or other containment and the top of the dike or sides of an impoundment, basin, open tank, or other containment.

(36) "Fugitive Emissions" means air contaminant emissions which are not planned and emanate from sources other than stacks, ducts, or vents or from non-point emission sources.

(37) "Generator" means any person or Federal Agency whose act or process produces hazardous waste identified or listed under Subpart A; provided, however, that certain producers may or may not be generators depending on whether they meet the criteria specified in Section 250.29 of Subpart B.

(38) "Groundwater" means water in the saturated zone beneath the land surface.

(39) "Hazardous Waste" has the meaning given in Section 1004(5) of the Act as further defined and identified in Subpart A.

(40) "Hazardous Waste Facility Personnel" means all persons who work at a hazardous waste treatment, storage, or disposal facility, and whose actions or failure to act may result in damage to human health or the environment.

(41) "Hazardous Waste Landfill" means an area in which hazardous waste is disposed of in accordance with the requirements of § 250.45-2.

(42) "Hydraulic Gradient" means the change in hydraulic pressure per unit of distance in a given direction.

(43) "Identification Code" means the unique code assigned by EPA to each generator, transporter, and treatment, storage, or disposal facility, pursuant to regulations published in § 250.40(c) herein and Subpart G.

(44) "Incinerator" means an engineered device using controlled flame combustion to thermally degrade hazardous waste. Examples of devices used for incineration include rotary kilns, fluidized beds, liquid injection incinerators, cement kilns, and utility boilers.

(45) "Incompatible Waste" means a waste unsuitable for commingling with

another waste or material, because the commingling might result in:

(i) Generation of extreme heat or pressure,

(ii) Fire,

(iii) Explosion or violent reaction,

(iv) Formation of substances which are shock sensitive friction-sensitive, or otherwise have the potential of reacting violently,

(v) Formation of toxic (as defined in Subpart A) dusts, mists, fumes, gases, or other chemicals, and

(vi) Volatilization of ignitable or toxic chemicals due to heat generation, in such a manner that the likelihood of contamination of groundwater, or escape of the substances into the environment, is increased, or

(vii) Any other reactions which might result in not meeting the Air Human Health and Environmental Standard. (See Appendix I for more details.)

(46) "Landfarming of a Waste" means application of waste onto land and/or incorporation into the surface soil, including the use of such waste as a fertilizer or soil conditioner. Synonyms include land application, land cultivation, land irrigation, land spreading, soilfarming, and soil incorporation.

(47) "Leachate" means the liquid that has percolated through or drained from hazardous waste or other man emplaced materials and contains soluble, partially soluble, or miscible components removed from such waste.

(48) "Leachate Collection and Removal System" means a system capable of collecting leachate and/or liquids generated within a hazardous waste landfill, and removing the leachate and/or liquids from the landfill. The system is placed or constructed above the landfill liner system.

(49) "Leachate Detection System" means a gravity flow drainage system installed between the top and bottom liners of a surface impoundment capable of detecting any leachate that passes through the top liner.

(50) "Leachate Detection and Removal System" means a system capable of detecting the presence of leachate and/or liquids beneath the bottom liner system of a landfill, and is capable of periodically removing leachate and/or liquids if found or known to be present.

(51) "Leachate Monitoring System" means a system beneath a facility used to monitor water quality in the unsaturated zone (zone of aeration) as necessary to detect leaks from landfills and surface impoundments. (For example, a pressure-vacuum lysimeter may be used to monitor water quality in the zone of aeration.)

(52) "Liner" means a layer of emplaced materials beneath a surface impoundment or landfill which serves to



restrict the escape of waste or its constituents from the impoundment of landfill.

(53) "Manifest" has the meaning given in Section 1004(12) of the Act as further defined and specified in Subpart B.

(54) "Manifest Document Number" means the serially increasing number assigned to the manifest by the generator for recordkeeping and reporting purposes.

(55) "Monitoring" means all procedures used to systematically inspect and collect data on operational parameters of the facility or on the quality of the air, groundwater, surface water, or soils.

(56) "Monitoring Well" means a well used to obtain water samples for water quality analysis or to measure groundwater levels.

(57) "Navigable Waters" means "waters of the United States, including the territorial seas". This term includes, but is not limited to:

(i) All waters which are presently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide, intermittent streams, and adjacent wetlands. "Wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds.

(ii) Tributaries of navigable waters of the United States, including adjacent wetlands;

(iii) Interstate waters, including wetlands; and

(iv) All other waters of the United States, such as intrastate lakes, rivers, streams, mudflats, sandflats, and wetlands, the use, degradation or destruction of which would affect or could affect interstate commerce; including, but not limited to:

(A) Intrastate lakes, rivers, streams, and wetlands which are or could be used by interstate travelers for recreational or other purposes;

(B) Intrastate lakes, rivers, streams, and wetlands from which fish or shellfish are or could be taken and sold in interstate commerce; and

(C) Intrastate lakes, rivers, streams, and wetlands which are used or could be used for industrial purposes by industries in interstate commerce.

(v) All impoundments of waters of the United States otherwise defined as navigable waters under this paragraph.

(58) "Non-Point Source" means a source from which pollutants emanate in an unconfined and unchanneled manner, including, but not limited to, the following:

(i) For non-point sources of water effluent, this includes those sources which are not controllable through permits issued pursuant to Sections 301 and 402 of the Clean Water Act. Non-point source water pollutants are not traceable to a discrete identifiable origin, but result from natural processes, such as nonchanneled run-off, precipitation, drainage, or seepage.

(ii) For non-point sources of air contaminant emissions, this normally includes any landfills, landfills, surface impoundments, and basins.

(59) "On-site" means on the same or geographically contiguous property. Two or more pieces of property which are geographically contiguous and are divided by public or private right(s)-of-way are considered a single site.

(60) "Open Burning" means the combustion of any material without the following characteristics:

(i) Control of combustion air to maintain adequate temperature for efficient combustion,

(ii) Containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and

(iii) Emission of the gaseous combustion products through a stack duct or vent adequate for both visual monitoring and point source sampling.

(61) "Owner/Operator" means the person who owns the land on which a facility is located and/or the person who is responsible for the overall operation of the facility.

(62) "Partial Closure Procedures" means the measures which must be taken by facility owners/operators who no longer accept hazardous waste for treatment, storage, or disposal on a specific portion of the site.

(63) "Permitted hazardous waste management facility (or permitted facility)" means a hazardous waste treatment, storage, or disposal facility that has received an EPA permit in accordance with the requirements of Subpart E or a permit from a State authorized in accordance with Subpart F.

(64) "Point Source" means any discernible, confined, and discrete conveyance, including, but not limited to, the following:

(i) For point sources of water effluent, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated feeding operation, vessel, or other floating craft from which pollutants are or may be discharged; and

(ii) For point sources of air contaminant emissions, any stack, duct, or vent from which pollutants are or may be discharged.

(65) "Post-Closure Care" means the monitoring and facility maintenance activities conducted after closure.

(66) "Publicly Owned Treatment Works" or "POTW" means a treatment works as defined in Section 212 of the Clean Water Act (CWA), which is owned by a State or municipality (as defined by Section 502(4) of the CWA). This definition includes any sewers that convey wastewater to such a treatment works, but does not include pipes, sewers, or other conveyances not connected to a facility providing treatment. This term also means the municipality as defined in Section 502(4) of the CWA, which has jurisdiction over the indirect discharges to, and the discharges from, such a treatment works.

(67) "Reactive Hazardous Waste" means hazardous waste defined by § 250.13(c)(1) of Subpart A.

(68) "Recharge Zone" means an area through which water enters an aquifer.

(69) "Regional Administrator" means the Regional Administrator for the Environmental Protection Agency Region in which the facility concerned is located, or his designee.

(70) "Regulatory Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height.

(71) "Reporting Quarter" means the three (3) month time period covered by each quarterly report; the reporting quarters end on the last day of March, June, September, and December.

(72) "Reporting Year" means the twelve month time period covered by each annual report; the reporting year ends on the last day of September.

(73) "Representative Sample" means a sample having average characteristics of all groundwater in the aquifer beneath the facility.

(74) "Retention Time" means the time hazardous waste is subjected to the combustion zone temperature.

(75) "Run-off" means that portion of precipitation that drains over land as surface flow.

(76) "Saturated Zone (Zone of Saturation)" means that part of the earth's crust in which all voids are filled with water.

(77) "Scavenging" means the unauthorized or uncontrolled removal of hazardous waste materials from a facility.

(78) "Secondary Container" means a storage device into which a container can be placed for the purpose of containing any leakage of hazardous waste from such replaced container.

(79) "Spill" means any unplanned discharge or release of hazardous waste onto or into the land, air or water.

(80) "Soil Barrier" means a layer of soil of a minimum of 1.5 meters (5 feet) in thickness with a permeability of  $1 \times 10^{-7}$  cm/sec or less which is used in construction of a landfill or a surface impoundment.

(81) "Soil Conditioner" means any substance added to the soil for the purpose of improving the soil's physical properties by increasing water content, increasing water retention, enhancing aggregation, increasing soil aeration, improving permeability, increasing infiltration, or reducing surface crusting.

(82) "Sole Source Aquifers" means those aquifers designated pursuant to Section 1424(e) of the Safe Drinking Water Act of 1974 (Pub. L. 93-523) which solely or principally supply drinking water to a large percentage of a populated area.

(83) "Storage Facility" means any facility which stores hazardous waste, except for generators who store their own waste on-site for less than 90 days for subsequent transport off-site, in accordance with regulations in Subpart B.

(84) "Storage Tank" means any manufactured non-portable covered device used for containing pumpable hazardous waste.

(85) "Surface Impoundment" means a natural topographic depression, artificial excavation, or dike arrangement with the following characteristics: (i) It is used primarily for holding, treatment, or disposal of waste; (ii) it may be constructed above, below, or partially in the ground or in navigable waters (e.g., wetlands); and (iii) it may or may not have a permeable bottom and/or sides. Examples include holding ponds and aeration ponds.

(86) "Training" means formal instruction, supplementing an employee's existing job knowledge, designed to protect human health and the environment via attendance and successful completion of a course of instruction in hazardous waste management procedures, including contingency plan implementation, relevant to those operations connected with the employee's position at the facility.

(87) "Transporter" means a person or Federal Agency engaged in the transportation of hazardous waste by air, rail, highway, or water.

(88) "Treated Area of a Landfarm" means that portion of a landfarm that has had hazardous waste applied to it, to include the zone of incorporation.

(89) "Treatment Facility" means any facility which treats hazardous waste.

(90) "Triple Rinsed" refers to a container which has been flushed three times, each time using a volume of di-

luent at least equal to ten percent of the container's capacity.

(91) "True Vapor Pressure" means the pressure exerted when a solid and/or liquid is in equilibrium with its own vapor. The vapor pressure is a function of the substance and of the temperature.

(92) "24-hour, 25-year Storm" means a storm of 24-hour duration with a probable recurrence interval of once in twenty-five years as defined by the National Weather Service in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States", May 1961, and subsequent amendments, or equivalent regional or State rainfall probability information developed therefrom.

(93) "Unsaturated Zone (Zone of Aeration)" means the zone between the land surface and the nearest saturated zone, in which the interstices are occupied partially by air.

(94) "United States" means the 50 States, District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

(95) "Underground Drinking Water Source" (UDWS) means:

(i) An aquifer supplying drinking water for human consumption, or

(ii) An aquifer in which the groundwater contains less than 10,000 mg/l total dissolved solids; or

(iii) An aquifer designated as such by the Administrator or a State.

(96) "Underground Non-Drinking Water Source" means an underground aquifer which is not a UDWS.

(97) "Vapor Recovery System" means a vapor gathering system capable of collecting vapors and discharged gases and a vapor processing system capable of processing such vapors and gases so as to prevent emission of contaminants to the atmosphere.

(98) "Volatile Waste" means waste with a true vapor pressure of greater than 78 mm Hg at 25° C.

(99) "Water Table" means the upper surface of the zone of saturation in groundwaters in which the hydrostatic pressure is equal to atmospheric pressure.

(100) "Wetlands" means those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do or would support, a prevalence of vegetation typically adapted for life in saturated or seasonally saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas, such as sloughs, potholes, wet meadows, river outflows, mudflats, and natural ponds.

(101) "Zone of Incorporation" means the depth to which the soil on a land-

farm is plowed or tilled to receive waste.

§ 250.42 Human health and environmental standards.

§ 250.42-1 Groundwater human health and environmental standard.

All facilities shall be located, designed, constructed, and operated in such a manner as to prevent:

(a) Endangerment of an Underground Drinking Water Source beyond the facility property boundary, or

(b) Endangerment of an aquifer which is designated as a sole or principal source aquifer according to Section 1424(e) of the Safe Drinking Water Act of 1974 (Pub. L. 93-523, 88 Stat. 1661, 1678, 42 U.S.C. 300f, 300h-3(e)).

§ 250.42-2 Surface water human health and environmental standard.

All facilities shall be located, designed, constructed, and operated in such a manner as to prevent any surface or sub-surface discharge from the facility into navigable waters from causing a violation of Water Quality Standards promulgated or approved under Section 303 of the Clean Water Act, or a violation of the controls on the discharge of oil or hazardous substances under Section 311 of the Clean Water Act.

§ 250.42-3 Air human health and environmental standard.

All facilities shall be located, designed, constructed, and operated in such a manner as to prevent air emissions from such facilities from causing a violation of standards or regulations promulgated pursuant to Sections 110, 111, and 112 of the Clean Air Act.

§ 250.43 General facility standards.

(a) All facilities with point source discharges to navigable waters, including discharges from leachate collection systems and/or surface water run-off collection systems, shall comply with all applicable regulations promulgated under the Clean Water Act (Pub. L. 92-500, as amended by Pub. L. 95-217). Additionally, facilities with discharges to municipal sewer systems shall meet applicable Clean Water Act pretreatment standards and have the approval of the municipal treatment system authority for that discharge.

(b) Diversion structures to divert all surface water run-off from the active portions of a facility for the 24-hour, 25-year storm shall be constructed, properly maintained and operated.

NOTE.—Owners/operators do not need to construct such diversion structures if they can demonstrate, at the time a permit is issued under Subpart E, that surface water run-off will not enter the facility and come into contact with the hazardous waste.

(c) Surface water run-off up to the quantity anticipated from a 24-hour, 25-year storm from active portions of a facility shall be collected and confined to a point source before discharge or treatment, as may be required by regulations promulgated under the Clean Water Act (Pub. L. 92-500, as amended by Pub. L. 95-217).

NOTE.—Owners/operators do not have to collect and confine surface water run-off from active portions of a facility if they can demonstrate that alternative non-point source control procedures will provide the same or greater degree of protection from surface water or groundwater pollution.

(d) Owners/operators shall not allow open burning of hazardous waste.

NOTE.—Open burning of hazardous waste may be permitted provided that the owner/operator can demonstrate that alternative treatment and disposal methods, including recycling or salvaging of materials, have been evaluated and determined to be technically or economically infeasible, or that the transport, treatment, and disposal of such waste poses a greater risk to human health or the environment than open burning.

(e) Any person who generates or removes a hazardous waste from a facility shall comply with the requirements of Subpart B.

(f) All owners/operators shall obtain a detailed chemical and physical analysis of each hazardous waste handled at the facility at the time of initiating management of the hazardous waste. This analysis shall identify the hazardous characteristics of the waste which must be known to enable the owner/operator to comply with the requirements of this Subpart, or with the conditions of a permit issued under the provisions of Subpart E.

NOTE.—The chemical and physical analysis may be limited based upon the method of treatment, storage, and/or disposal, and upon existing available evidence regarding the waste's composition.

(g) The detailed analysis of each waste stream shall be obtained or repeated as necessary by the owner/operator. (For example, a minimal analysis pursuant to paragraph (h) below) of the waste might indicate a change in the waste stream characteristics, or the owner/operator might become aware of a modification in the manufacturing process generating the waste). The detailed waste sampling frequency shall be no less than annually.

(h) All owners/operators shall sample each truckload or other shipment or batch of hazardous waste, designated for treatment, storage, or disposal at the facility. Each sample, at a minimum, shall be analyzed for the following properties:

(i) Physical appearance, such as color and physical state (e.g., liquid, solid, semi-solid)

(ii) Specific gravity

(iii) pH

(iv) Vapor pressure, if applicable.

NOTE.—In the case of on-site facilities, less frequent sampling and analysis may be allowed if the owner/operator can demonstrate that no loss in control over facility operations will occur.

(i) Owners/operators shall close, in accordance with the requirements of § 250.43-7, all portions of a facility which does not comply with the applicable requirements of this Subpart.

(j) All owners/operators shall comply with applicable requirements of State Water Quality Management Plans approved by the Administrator under Section 208 of the Clean Water Act (Pub. L. 92-500, as amended by Pub. L. 95-217).

(k) Non-point source discharges from facilities into navigable waters shall not cause or contribute to the violation of water quality standards promulgated or approved under Section 303 of the Clean Water Act (pub. L. 92-500, as amended by Pub. L. 95-217).

#### § 250.43-1 General site selection.

(a) Facilities shall not be located in an active fault zone.

(b) In accordance with Executive Order 11988, "Floodplain Management", a facility shall not be located in a "regulatory floodway" as adopted by communities participating in the National Flood Insurance Program (NFIP) managed by the Federal Insurance Administration (FIA) of the U.S. Department of Housing and Urban Development. In cases where regulatory floodways have not been designated by the FIA, the owner/operator shall obtain an analysis, using FIA-approved methods, to determine whether the facility is located within a non-regulatory floodway (i.e., a floodway which is currently not regulated by the FIA). A facility shall not be located in an area determined by the analysis to be a regulatory floodway.

(c) In accordance with Executive Order 11988, "Floodplain Management", a facility shall not be located in a "coastal high hazard area" as defined on a Flood Insurance Rate Map (FIRM) by the FIA. In cases where a coastal high hazard area has not been designated by the FIA, the facility owner/operator shall obtain an analysis, using FIA-approved methods, to determine whether the facility is located within a coastal high hazard area. A facility shall not be located in an area determined by the analysis to be a coastal high hazard area.

NOTE.—A facility may be located in a coastal high hazard area if it can be demonstrated that the facility is designed, constructed, operated and maintained so that the facility will not be inundated by high velocity waters, including but not limited to

hurricane wave wash or tsunamis, designated on Flood Insurance Maps as zone VI-30.

(d) In accordance with Executive Order 11988, "Floodplain Management", a facility shall not be located in a 500-year floodplain.

NOTE.—A facility may be located in a 500-year floodplain if it can be demonstrated, at the time a permit is issued pursuant to Subpart E, that the facility is designed, constructed, operated, and maintained so that it will not be inundated by a 500-year flood.

(e) In accordance with Executive Order 11990, "Protection of Wetlands", a facility shall not be located in a wetland.

NOTE.—A facility may be located in wetlands if:

(1) The owner/operator obtains a National Pollutant Discharge Elimination System permit under Section 402 of the Clean Water Act (Pub. L. 92-500, as amended by Pub. L. 95-217, 33 U.S.C. 1251 et seq.), and,

(2) In the case where dredging or filling of the wetland is directly associated with the facility, the owner/operator obtains a permit issued under authority of Section 404 of the Clean Water Act (Pub. L. 92-500, as amended by Pub. L. 95-217, 33 U.S.C. 1251 et seq.).

(f) A facility shall not be located so as to be likely to jeopardize the continued existence of Endangered and Threatened Species as listed pursuant to the Endangered Species Act of 1973 (16 U.S.C., 1530 et seq.) in 50 CFR; nor result in the destruction or adverse modification of their Critical Habitat as contained in 50 CFR Part 17, Subpart F: Critical Habitat, 1760 et seq.

NOTE.—A facility may be located in a Critical Habitat area if, after consultation with the Office of Endangered Species, U.S. Fish and Wildlife Service, Department of the Interior, it can be demonstrated that, at the time a permit is issued pursuant to Subpart E, the treatment, storage, and/or disposal operations carried out by the facility will not jeopardize the continued existence of Endangered and Threatened Species located within the Critical Habitat areas listed in 50 CFR Part 17.

(g) A facility shall not be located in the recharge zone of a sole source aquifer designated pursuant to Section 1424(e) of the Safe Drinking Water Act (Pub. L. 93-523).

NOTE.—A facility may be located in the recharge zone of a sole source aquifer if it can be demonstrated, at the time a permit is issued pursuant to Subpart E, that the facility is located, designed, constructed, operated, maintained, and monitored to prevent endangerment of the sole source aquifer.

(h) Active portions of a facility shall be located a minimum of 60 meters (200 feet) from the property line of the facility.

NOTE.—Facility owners/operators may locate active portions of their facilities closer than 60 meters (200 feet) from their property line if it can be demonstrated that unexpected releases or discharges of hazard-

ous waste resulting from fires, explosions, spills, and underground leaks can be controlled before they cross the facility property boundary.

§ 250.43-2 Security.

(a) A facility shall have a 2 meter (6 foot) fence completely surrounding the active portion of the facility capable of preventing the unknowing and/or unauthorized entry of persons and domestic livestock.

NOTE.—A facility does not have to have a 2 meter (6 foot) fence surrounding the active portion of the facility if it can be demonstrated, at the time a permit is issued pursuant to Subpart E, that the active portion of the facility is surrounded by a natural or artificial barrier capable of preventing the unknowing and/or unauthorized entry of persons and domestic livestock.

(b) Ingress through each gate or other access on to the active portion of the facility shall be controlled by an attendant, or a mechanical or an electromechanical device, whenever the facility is in operation (e.g., security personnel, key cards, or television monitors). Each gate or other access shall be secured to prevent ingress whenever the facility is not in operation.

(c) A sign, in the English language and in any other predominant language of the area surrounding the facility (e.g., facilities in States bordering Mexico and Canada shall have signs posted in Spanish and French, respectively), having the following legend—WARNING—Unauthorized Personnel Keep Out—shall be posted at each access to the active portions of the facility. The sign shall consist of block letters not less than four (4) inches in height. The letters shall be of a color offering high contrast with the background color of the sign.

NOTE.—A facility may deviate from the specified four (4) inch block letters and legend of the sign provided that it can be demonstrated that an alternative legible and clearly visible sign, warning against unauthorized entry, is posted at each access point to the active portion(s) of a facility, or it can be demonstrated that such precautionary measures are not needed because of the particular operation of and the waste handled at the facility.

§ 250.43-3 Contingency plan and emergency procedures.

(a) Contingency plan: (1) The owner/operator shall develop a contingency plan for each facility so as to prevent or minimize human health or environmental damage in the event of a discharge or release of hazardous waste. The provisions of the plan shall, as a minimum, follow the provisions of the Section 311 Spill Prevention, Control, and Countermeasures Plan (SPCC) of the Clean Water Act. The provisions of the plan shall be implemented immediately in the event of

a discharge or release of hazardous waste from the facility.

(2) A copy of the contingency plan shall be filed with the Regional Administrator and with all local police departments, fire departments, hospitals and emergency response teams who may be called upon to provide emergency services. Where a permit is issued by EPA under Subpart E, the contingency plan shall be submitted to the Regional Administrator as part of the permit application and shall become a condition of any permit issued. Amendments to the plan due to changes in the facility design, construction, operation, or maintenance which materially increase the potential for discharges of hazardous waste shall be reported immediately, in writing, to the aforementioned parties having copies of the plan. The plan shall be revised in cases of changed circumstances, changed regulations, and failure of the plan to be adequate in an emergency.

(3) The plan shall describe arrangements made with local police departments, fire departments, hospitals, and emergency response teams to coordinate emergency services. These arrangements shall include:

(i) Familiarization of police, fire departments, and emergency response teams with layout of and waste handled at the facility, and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility and possible evacuation routes; and

(ii) Where necessary, agreements designating primary emergency authority to one police and one fire department jurisdiction in the event that more than one might respond to the emergency, and agreements with any others to provide support to the primary emergency authority.

NOTE.—Arrangements need not be made with local police agencies, fire departments, hospitals, and emergency response teams if the owner/operator can demonstrate that hazards do not exist at the facility which necessitate the services of the above mentioned organizations.

(4) At all times when the facility is in operation, there shall be at least one person present with the responsibility of coordinating all emergency response measures. This facility emergency coordinator shall be thoroughly familiar with all aspects of the facility's contingency plan, all operations activities at the facility, the location and characteristics of waste handled, the location of manifests within the facility, and the facility layout. (The emergency coordinator's responsibilities are more fully spelled out in § 250.43-3(c).)

(5) The names, addresses, and phone numbers (office and home) of all persons qualified to act as facility emer-

gency coordinators under paragraph (a)(4) shall be listed in the contingency plan.

(6) The plan shall include a list, physical description, and description of the capabilities of all emergency equipment at the facility, including fire extinguishing systems, spill control equipment, alarms (internal and external), and decontamination equipment.

(7) The plan shall include an evacuation plan for facility personnel and shall outline evacuation routes, signal(s) to be used to begin evacuation, and alternate evacuation routes if the primary routes potentially can be blocked by discharges of hazardous waste and fires.

(8) The plan shall include an outline of a program for familiarizing employees with emergency procedures, emergency equipment, and emergency systems, to include the following:

(i) Alarm signal, shutdown of operations, evacuation, and drills on these procedures.

(ii) Key parameters for incinerator automatic waste feed cut-off as prescribed in § 250.45-1(b)(4); and

(iii) Procedures for repair and replacement of facility monitoring equipment.

(b) Preparedness and prevention.

(1) Facilities shall be designed, operated, and constructed so that the likelihood of a discharge, fire, or explosion harmful to human health or the environment is minimized.

(2) All facilities subject to EPA's oil and hazardous substances pollution prevention regulations shall have, as a minimum, a valid SPCC Plan as required by regulations issued pursuant to Section 311 of the Clean Water Act (CWA).

(3) All facilities shall be equipped with the following: (i) An alarm, a telephone (immediately available at the scene of operations), a hand-held two-way radio, or similar device capable of summoning external emergency assistance (i.e., local police departments, fire departments, and emergency response teams).

NOTE.—An alarm, telephone, or two-way radio is not needed if the owner/operator can demonstrate that hazards at the facility requiring external emergency assistance do not exist.

(ii) An internal communications system capable of providing immediate emergency instruction (voice or signal) to facility employees.

(4) At any time that hazardous waste is being poured, mixed, spread, or otherwise handled, all employees involved in the operation shall have immediate access to an internal or external alarm or emergency communication device, either directly or through visual or voice contact with another employee. If at any time

during operation of the facility there is a sole employee on the premises, he shall have immediate access to an alarm, telephone (immediately available at the scene of operation), hand-held two-way radio, or similar device capable of summoning external emergency assistance.

(5) A facility shall have the following:

(i) Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment;

(ii) Water at adequate volume and pressure to supply water hose streams, foam producing equipment, automatic sprinklers, or water spray systems; and

(iii) Special extinguishing equipment, such as that utilizing foam inert gas, or dry chemical.

NOTE.—Fire extinguishing equipment, fire control equipment, is not needed if the owner/operator can demonstrate that hazards at the facility which necessitate the need for such equipment do not exist.

(6) All facility fire protection equipment, spill control equipment, and decontamination equipment shall be tested, inspected, and maintained in satisfactory operating condition to serve its purpose in time of emergency.

(7) Aisle space shall be maintained for unobstructed movement of personnel, and maintained so that fire protection equipment, spill control equipment, and decontamination equipment can be brought to bear on any area of facility operation in time of emergency.

NOTE.—Aisle space need not be maintained for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment if the owner/operator can demonstrate that the aisle space is not necessary for the movement of personnel and it is not necessary to bring in fire protection equipment, spill control equipment, and decontamination equipment.

(8) Precautions shall be taken to prevent accidental ignition of ignitable materials. Sources of ignition, including but not limited to open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks, spontaneous ignition, including heat-producing chemical reactions; and radiant heat, shall be eliminated or ignitable materials protected from such sources of ignition.

(9) While ignitable or reactive waste is being handled, smoking shall not be permitted and no one near the waste shall possess an open flame. Smoking and open flame shall be prohibited at the facility except in designated localities. "No Smoking" signs shall be conspicuously posted where hazard from ignitable or reactive waste is normally present.

(c) *Response and recovery.* (1) In the event that a facility has a discharge or release of hazardous waste, a fire, or an explosion which has the potential for damaging human health or the environment, the facility's emergency coordinator shall telephone the United States Coast Guard National Response Center's twenty-four (24) hour toll free number, 800-424-8802, or the Government official designated in the applicable regional contingency plan pursuant to 40 CFR 1510 as the on-scene coordinator for that geographic area, to report such an incident immediately after discovering it and adhere to the requirements of Section 250.37 in Subpart C for reporting.

(2) Where applicable, the facility's emergency coordinator shall activate internal facility alarms or communication systems to notify all personnel of an imminent or actual emergency situation.

(3) The facility's emergency coordinator shall notify appropriate agencies with designated response roles immediately if an emergency at the facility presents a potential threat to local populated areas, or if their assistance is necessary.

(4) The facility's emergency coordinator shall notify appropriate local authorities immediately if his assessment indicates that evacuation of local areas may be advisable. The emergency coordinator shall be prepared to assist authorities in making the final determination as to whether evacuation is necessary.

(5) In the event of a discharge, the facility's emergency coordinator shall identify the character, exact source, volume, and extent of the discharged materials by review of facility records and manifests, and if necessary, by chemical analysis.

(6) The facility's emergency coordinator shall assess possible hazards to local communities associated with a discharge. This assessment shall include consideration of indirect effects, such as toxic, irritating, or asphyxiating gases, hazardous surface run-off due to water or chemical agents used to control fire, and heat-induced explosions.

(7) The facility's emergency coordinator, in cooperation with appropriate Federal, State, and local officials, shall determine what actions should be taken to mitigate damage or injury to the community and its residents. This determination shall indicate whether:

(i) Local communities may have been exposed to a hazardous substance; and

(ii) Evacuation of local populated areas should be initiated because of imminent danger (i.e., from toxic combustion products, ignitable or explosive vapors, threatened explosions, etc.).

(8) The facility's emergency coordinator shall take all reasonable measures necessary to ensure that fires and explosions do not re-occur and do not spread to other hazardous waste at the facility. These shall include, where applicable, cessation of processes and operations, collection and containment of discharged waste, removal or isolation of containers, etc.

(9) The facility's emergency coordinator shall provide for treatment, storage, or disposal or recovered waste, contaminated soil, or material resulting from an accident at the facility. The recovered waste, contaminated soil, or contaminated material shall be analyzed to determine whether it is a hazardous waste, or assumed to be a hazardous waste.

(10) The facility's emergency coordinator shall ensure that no waste which may be incompatible with the released material is accepted for treatment, storage, or disposal at the facility until clean-up procedures are completed, emergency equipment restored to pre-accident condition, and the affected area is declared safe by EPA, State, or local officials.

(11) Where applicable, the facility's emergency coordinator shall, subsequent to shut-down of operations in response to a discharge, fire, or explosion, monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment.

(12) The facility's emergency coordinator shall ensure that all emergency equipment specified in the plan, including vehicles, pumps, and temporary storage containers, are cleaned and restored to pre-accident condition before operations are resumed.

(13) The facility's emergency coordinator shall record the time, date, and nature of the emergency, and convey a preliminary report with this and any other pertinent information on the emergency to the Regional Administrator, as required in § 250.43-5(c)(1) of this Subpart.

#### § 250.43-4 Training.

(a) Within six (6) months after the effective date of these regulations, or after the date of employment, whichever is later, personnel at new and existing facilities shall have attended and successfully completed a course of instruction or shall have demonstrated a sufficient degree of competence in hazardous waste management procedures relevant to the position in which they are employed.

(b) Owners/operators of facilities shall:

(1) Maintain the following records and make them available to the Regional Administrator upon request:

(i) A list of the job titles of all positions at the facility related to hazardous waste management;



(ii) A written job description for each position listed under paragraph (b)(1)(i) which shall include the requisite skill, education, responsibilities, and duties related to each position;

(iii) A written description of the type and quantity of introductory and continuing training that will be administered to each person filling a position listed under paragraph (b)(1)(i);

(iv) Records that document that the training required under paragraph (a) has been administered to facility personnel;

(2) Have their personnel trained in contingency procedures as prescribed in the facility's contingency plan required under § 250.43-3, and

(3) Have their personnel take part in an annual review and update of their initial training in contingency procedures and other hazardous waste management procedures relevant to those operations at which they are employed.

§ 250.43-5 Manifest system, recordkeeping, and reporting.

(a) *Manifest system.* An owner/operator of a facility which receives hazardous waste accompanied by a manifest or a delivery document shall:

(1) Provide at least one (1) copy of the manifest or delivery document, after it has been signed and dated by an authorized representative of the facility, to the transporter as certification of receipt of the shipment covered by the manifest or delivery document.

(2) Forward, within thirty (30) days, the original copy of the manifest or delivery document, after it has been signed and dated by an authorized representative of the facility, to the generator as certification of receipt of the shipment covered by the manifest or delivery document.

(3) Acknowledge each individual shipment received; when a single manifest is used for multiple shipments as described in § 250.22(f) of Subpart B, by initialing each shipment, and then complying with paragraph (a)(2).

(4) Indicate, in the comments section of the manifest or delivery document, discrepancies, such as differences between the type and/or quantity of hazardous waste designated on the manifest or delivery document, and the type and/or quantity of hazardous waste actually received. The owner/operator shall notify the Regional Administrator immediately when such discrepancies are discovered by forwarding a copy of the manifest or delivery document to the Regional Administrator.

(b) *Recordkeeping.* (1) An owner/operator of a facility shall keep an operating log. This log shall, at all reasonable times, be open for inspection by

any duly designated employee or agent of EPA.

(2) The following information shall be recorded promptly, as it becomes available, and maintained in the operating log until closure of the facility:

(i) A record of each hazardous waste treated, stored, or disposed of at the facility to include the following:

(A) A description of each hazardous waste by its U.S. Department of Transportation (DOT) proper shipping name (40 CFR 172), or by the U.S. Environmental Protection Agency (EPA) name (as listed in § 250.14 of Subpart A), if the DOT proper shipping name is not applicable. However, if the DOT proper shipping name "NOT OTHERWISE SPECIFIED" (NOS) is used, the EPA name must also be designated on records after the DOT proper shipping name NOS;

(B) The DOT hazard class of each waste (as identified in 49 CFR 172), or the EPA characteristic(s) or property (as identified or listed in §§ 250.13 or 250.14 of Subpart A) if the DOT hazard class is not applicable. However, if the DOT hazard class "OTHER REGULATED MATERIALS" (ORM) is used, the EPA characteristics or property (as identified or listed in §§ 250.13 or 250.14 of Subpart A) must also be designated on records after the DOT hazard class ORM;

(C) The quantity (in units of volume or weight of pounds (P), tons (T), gallons (G), or cubic yards (CY)) of each hazardous waste treated, stored, or disposed; the method of treatment, storage, and disposal used for each hazardous waste; and the dates of treatment, storage, and disposal of each hazardous waste.

(ii) Locations, with respect to permanently surveyed benchmarks, where each type of waste is stored or disposed. The location of wastes in landfills shall be recorded as specified in § 250.45-2(b)(3) and in surface impoundments as specified in § 250.45-3(d)(3).

(iii) Waste analyses, as specified in § 250.43 (f), (g), and (h);

(iv) Monitoring data, as required in § 250.43-8;

(v) Summary reports and records of all incidents requiring initiation of a contingency plan, or resulting in human health or environmental damage;

(iv) Records or results of visual inspections as required by § 250.43-6(b).

(3) Records required under paragraphs (b)(2) (i) and (ii) above specifying the location and types of disposed wastes shall be turned over to the Regional Administrator upon closure of the facility.

(4) Records of operating conditions (temperature, pressure, residue time, feed rate, etc.) as required in § 250.45

shall be maintained for a period of three (3) years.

(5) Training records required under § 250.43-4(b)(1) (i)-(iii) shall be maintained until closure of the facility. Training records required under § 250.43-4(b)(1)(iv) shall be retained for a period of three (3) years; but employee training records may accompany personnel transferred within the same company.

(6) An owner/operator of a facility accepting deliveries of hazardous waste from off-site sources for treatment, storage, or disposal shall retain for a period of three (3) years a copy of each manifest or delivery document as certified by the generator, transporter, and owner/operator of the facility.

(c) *Reporting.* (1) An owner/operator of a facility shall comply with the requirements under § 250.43-3(c)(1) in reporting incidents such as fires, explosions, and discharges or releases of hazardous materials into the environment which have the potential for damaging human health or the environment.

(2) An owner/operator of a facility shall report to the Regional Administrator monitoring data as required in § 250.43-8(c)(4) and (d)(1).

(3) An owner/operator of a facility shall notify the Regional Administrator prior to cessation of treatment, storage, and/or disposal operations, or prior to final facility closure as specified in § 250.43-7.

(4) Owners/operators of facilities which treat, store, or dispose of hazardous waste on the site of waste generation shall comply with the reporting requirements of § 250.23(d) and (e) of Subpart B.

(5) An owner/operator of a facility which receives hazardous waste for treatment, storage, or disposal shall:

(i) Prepare an annual report summarizing the information from all manifests or delivery documents for shipments of hazardous waste certified as received during the reporting year;

(ii) Send the annual report within four (4) weeks after the closing date of the reporting year to the Regional Administrator;

(iii) Include in the annual report the following information (see Figure 1 for the report form):

(A) The identification code, name, and address of the facility;

(B) The closing date of the reporting year;

(C) The identification code of each hazardous waste generator from which a hazardous waste was received during the reporting year; for international shipments, the name and address of the generator shall be designated;

(D) The name and common code as they appear on the manifest under "shipping description" of each hazard-



ous waste which was received from each hazardous waste generator;

(E) The quantity of each hazardous waste received from each generator;

(F) The units of volume or weight of each quantity of hazardous waste in pounds (P), tons (T), gallons (G), or cubic yards (CY);

(G) The method of treatment, storage, or disposal for each hazardous waste; and

(H) A certification which reads: "I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." An authorized representative of the owner/operator of the facility shall sign and date the certification.

(6) An owner/operator of a facility which receives one or more deliveries of hazardous waste which is not accompanied by a manifest or delivery document, except where a manifest or delivery document is not required because of the generator exemptions in § 250.29 of Subpart B, shall submit a quarterly report of all such shipments of hazardous waste to the Regional Administrator. The quarterly report shall include the following information (see Figure 1 for the report form):

(i) The identification code, name, and address of the facility;

The closing date of the reporting quarter;

(iii) The word "unmanifested" under the column entitled Manifest Document Number on the report form;

(iv) The name and address of the generator, if known, or the transporter;

(v) The name and common code of the hazardous waste (under "shipping description"), by its Department of Transportation (DOT) proper shipping name (49 CFR 172), or by the U.S. Environmental Protection Agency (EPA) name (as listed in § 250.14 of Subpart A) if the DOT proper shipping name is not applicable. However, if the DOT proper shipping name "NOT OTHERWISE SPECIFIED" (NOS) is used, the EPA name and common code (as listed in § 250.14 of Subpart A) must also be designated on the manifest after the DOT proper shipping name NOS;

(vi) The quantity of each hazardous waste received;

(vii) The units of volume or weight of each quantity of hazardous waste in pounds (P), tons (T), gallons (G), or cubic yards (CY);

(viii) A certification which reads: "I have personally examined and am familiar with the information submitted in this certification, and I hereby cer-

tify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment," and shall certify the information on the report by having an authorized representative of the owner/operator of the facility sign and date the certification; and

(ix) A brief explanation of why the shipment was unmanifested, if known, in the comments section of the report form.

#### § 250.43-6 Visual inspections.

(a) An owner/operator of a facility, at least once each day, shall visually inspect the following:

(1) Storage areas for rust, corrosion, cracks in storage devices, missing or improper labels, and spills;

(2) Dikes for possible damage or structural weakening and drainage systems for possible stoppage;

(3) Operating and monitoring equipment and readings to ensure normal operation and readings;

(4) Emergency response equipment to ensure that it meets the requirements specified in § 250.43-4 (1)(4);

(5) Fences or barriers surrounding the facility for possible damage;

(6) Vegetation on or around the facility for possible damage; and

(7) The active portion of the facility for fugitive air emissions.

NOTE.—Visual inspections for certain aspects of facility operations may be conducted less frequently than daily if the facility owner/operator can demonstrate that lesser requirements would still provide adequate protection of human health and the environment.

(b) The observations made in each visual inspection shall be recorded in the facility's daily operating log.

#### § 250.43-7 Closure and post-closure.

(a) In addition to complying with the requirements of this Section, an owner/operator of a facility shall also comply with the applicable Financial Requirements in Section 250.43-9.

(b) An owner/operator of a facility from which hazardous waste will not be removed and will remain in the facility after closure (e.g., a landfill) shall record in the deed of the property on which the facility is located a stipulation that use of the property by the owner/operator or any future owner of the property after closure shall be conducted in a manner to prevent disturbance of the integrity of the final cover, the liner or the monitoring systems of the facility.

(c) The owner/operator of a facility shall submit a closure plan to the Regional Administrator prior to beginning treatment, storage and/or disposal operations or at the time of and as part of the application for a permit

pursuant to Subpart E. The closure plan shall include, but not be limited to:

(1) A description of how the facility shall be closed.

(2) A description of possible uses of the land after closure.

(3) The anticipated time until close-out, the estimated time(s) required for closure and any anticipated partial closures.

(d) An owner/operator of a facility other than a landfill shall notify the Regional Administrator:

(1) Of intent to close-out the facility at least 15 days before close-out; and

(2) Of completion of closure at least 90 days before closure.

(e) An owner/operator of a landfill facility shall notify the Regional Administrator:

(1) Of intent to partially close the facility (i.e., close a portion of the facility) at least 15 days before partial closure;

(2) Of intent to close-out the facility at least 15 days before close-out; and

(3) Of completion of closure at least 180 days before closure.

(f) Within 90 days after close-out, all disposal operations shall be completed and all hazardous waste shall be removed from storage and treatment operations and disposed of in accordance with requirements in Subparts B, C, and D.

(g) Closure shall be completed within 3 years after close-out.

(h) At completion of closure, all equipment used in the operation shall be properly disposed of or decontaminated by removal of all hazardous waste and residues.

(i) At completion of closure, all facilities shall be secured so that humans or animal life cannot come into contact with hazardous waste, and so that discharges of waste harmful to human health or the environment will not occur.

(j) At completion of closure, all required equipment shall be provided and arrangements shall be made to continue post-closure monitoring as required in paragraph (m)(1)(i) at landfills, and other facilities where hazardous waste has not been removed as part of closure.

(k) At completion of closure, and again upon completion of post-closure care (in the case of a landfill and other facilities where hazardous waste is not removed as part of closure), the owner/operator shall submit to the Regional Administrator certification by the owner/operator and certification by a registered professional engineer that the facility has been closed in accordance with the requirements of this Subpart.

(l) Within 180 days after completion of closure, the owner/operator of a landfill or other facility, where haz-

ardous waste is not removed as part of closure, shall file with the local land authority and the Regional Administrator, a survey plat, certified by a registered professional land surveyor, indicating the type and location of hazardous waste disposed of in the facility.

(m) An owner/operator of a landfill or other facility where hazardous waste is not removed as part of closure shall provide post-closure care for a period of at least 20 years from the date of closure.

NOTE.—The owner or operator may request that, at the discretion of the Regional Administrator, a determination be made of whether some or all post-closure requirements may be discontinued earlier than 20 years after closure. The facility owner or operator shall bring forth evidence showing why post-closure care need not continue, i.e., no leaks have been detected, advanced technology was used, alternate disposal techniques were employed, etc.

(n) Post-closure care shall consist of at least the following:

(1) Monitoring and reporting of in accordance with the requirements of § 250.43-8(c) (2, 3 and 4) and (d) (1 and 2).

(2) Maintenance of facility security and waste containment devices.

(o) If the owner/operator of a facility transfers the ownership or operation of the facility during the 20-year post-closure care period, the new owner/operator shall comply with the requirements of this Section.

#### § 250.43-8 Groundwater and leachate monitoring.

An owner/operator of a landfill or surface impoundment facility shall install, maintain and operate a Groundwater Monitoring System and a Leachate Monitoring System as specified in this Section and shall comply with the Sampling and Analysis and the Recordkeeping and Reporting requirements of this Section.

##### (a) Groundwater monitoring system.

(1) A Groundwater Monitoring System shall consist of a minimum of four (4) monitoring wells meeting the following specifications:

(i) At least one well shall be located in an area hydraulically upgradient from the active portion of the facility so as to yield samples representative of the background quality of the groundwater which flows under the facility.

(ii) A minimum of three (3) monitoring wells shall be installed hydraulically downgradient of the active portion of the facility and shall be sunk to different depths in order to detect any leachate which has migrated into groundwater(s) underlying the facility property. Each well shall be constructed to draw samples from the depths where the facility owner/operator can

demonstrate that contamination is most likely to occur.

(iii) At least one of the three (3) wells specified in (ii) shall be located immediately adjacent to the active portion of the facility. The other wells shall be located within the property line of the facility to provide the greatest opportunity for interception of any leachate that migrates into groundwater(s) underlying the facility.

(2) All monitoring wells shall be cased, and the annular space shall be backfilled with an impermeable material in order to prevent surface water from entering the well bore and inter-aquifer water exchange.

NOTE.—A Groundwater Monitoring System shall not be required or a lesser degree of groundwater monitoring may be utilized, if the owner/operator can demonstrate, at the time a permit is issued under Subpart E, that the geologic and hydrologic conditions underlying the facility indicate no potential for discharge to groundwater. Wells may be sunk to draw samples at a single depth if it can be demonstrated by the facility owner/operator that it is the depth where contamination is likely to occur.

(b) *Leachate monitoring system.* (1) A Leachate Monitoring System shall be installed within the zone of aeration underlying the facility without drilling through the bottom and side liners or soil barriers of the landfill or surface impoundment and shall be designed to collect samples in the zone of aeration between the bottom of the liner or soil barrier of the landfill or surface impoundment and the top of the water table.

NOTE.—A Leachate Monitoring System shall not be required if the owner/operator can demonstrate that an alternative leachate monitoring technique will detect leaks as effectively as the system prescribed in this paragraph. A Leachate Detection and Removal System installed below the liner or soil barrier of landfills pursuant to § 250.45-2(b)(12) and a Leachate Detection System installed below the liner or soil barrier of surface impoundments pursuant to § 250.45-3(c)(3) shall be considered an acceptable substitute for a Leachate Monitoring System.

(c) *Sampling and analysis.* (1) The background level of the quality of both the groundwater and the water in the zone of aeration underlying the facility shall be established by conducting the comprehensive analysis specified in paragraph (c)(6) on samples collected from the Groundwater Monitoring and Leachate Monitoring Systems on a monthly basis for at least one year. For a new facility, comprehensive analysis of monthly samples shall begin at least 3 months prior to the treatment, storage or disposal of any hazardous waste at the facility.

NOTE.—Samples withdrawn from a Leachate Monitoring System during the back-

ground monitoring schedule may be analyzed for representative characteristics of the comprehensive analysis if an adequate volume of sample cannot be collected to analyze for all of the characteristics specified in the comprehensive analysis.

(2) After the background level has been established pursuant to paragraph (c)(1), samples shall be taken from the Groundwater Monitoring System at least once a year and analyzed pursuant to the requirements of paragraph (c)(6) and, in addition, samples shall be taken from the Groundwater Monitoring System on the following frequency and analyzed pursuant to the requirements of paragraph (c)(5):

(i) Semi-annually, if the groundwater flow rate ranges between 25 and 50 m/year (82 and 164 ft/year) or

(ii) Quarterly, if the groundwater flow rate is greater than 50 m/year (164 ft/year).

(3) After the background level has been established pursuant to paragraph (c)(1), samples shall be taken from the Leachate Monitoring System at least once a year and analyzed in accordance with the requirements of paragraph (c)(6) and, in addition, samples shall be taken from the Leachate Monitoring System at least once each quarter and analyzed in accordance with the requirements of paragraph (c)(5).

NOTE.—This requirement is waived if the owner/operator can demonstrate that the quantity of any samples that can be obtained from the Leachate Monitoring System is insufficient for conducting the required analyses.

(4) If after the background levels are established pursuant to paragraph (c)(1), the analyses of samples taken pursuant to paragraph (c)(2) or (c)(3) shows that the quality of the groundwater or the water in the zone of aeration significantly differs, as determined by the Student's *t*, single-tailed test at the 95 percent confidence level, from the background quality of these waters, the owner/operator shall:

(i) Notify the Regional Administrator within 7 days after such a finding;

(ii) Determine, if possible, the cause of the difference in quality (e.g., the result of a spill, a design failure, an improper operating procedure); and

(iii) Determine the extent of groundwater contamination or the potential for groundwater contamination and discontinue operation of the facility until the Regional Administrator determines what actions are to be taken.

(5) A minimum analysis shall quantify the following characteristics of the sample:

(i) Specific conductivity, mho/cm at 25°C;

(i) pH;

(iii) Concentration of chloride, mg/liter;

(iv) Concentration of total dissolved solids, mg/liter;

(v) Concentration of dissolved organic carbon, mg/liter; and

(vi) The concentrations of the principal hazardous constituents, or indicators thereof, found in the largest quantity in the hazardous waste disposed of in the facility, mg/liter.

(6) A comprehensive analysis shall quantify the following characteristics of the sample:

(i) Those characteristics listed in paragraph (5); and

(ii) The concentrations of the contaminants and the levels of the properties listed in Appendix II, except radioactivity levels if the facility does not treat, store, or dispose of waste containing radioactive substances.

(iii) Concentration of beryllium, mg/liter.

(iv) Concentration of nickel, mg/liter.

(v) Concentration of cyanide, mg/liter.

(vi) Concentration of phenolic compounds (as phenol) mg/liter.

(vii) Presence of organic constituents as determined by a scanning by gas chromatography.

NOTE.—After the background level has been established, pursuant to paragraph (c)(1), the comprehensive analysis may be reduced to eliminate the analysis of characteristics that would not result from waste treated, stored or disposed of at the facility.

(d) *Recordkeeping and reporting.* (1) An owner/operator of a facility shall forward to the Regional Administrator at the end of each reporting quarter two copies of the monitoring data developed pursuant to the requirements of paragraphs (c)(2) and (c)(3) during the reporting quarter.

(2) An owner/operator of a facility shall be required to retain, for a minimum of 3 years, all records of monitoring and analytical activities and data, including all original strip chart recordings and instrumentation, calibration, and maintenance records:

#### § 250.43-9 Financial requirements.

(a) *Continuity of operation.* (1) *Requirements for facility closure.* (i) *Cost estimation.* An owner/operator of a facility shall file as a part of his application for a permit for the facility an estimate of the costs of closing the facility after its capacity is reached or operations have otherwise terminated, in accordance with the requirements of Section 250.43-7. The Regional Administrator will evaluate this cost estimate and either accept the estimate as made or shall revise it in accordance with his evaluation.

(ii) *Financial assurance for facility closure.* An owner/operator of a facility shall establish a secured closure trust fund designated, "in trust for the closure of the facility." A bank or other financial institution approved by the Regional Administrator shall act as the trustee of the closure trust fund. The trust instrument shall provide (1) that disbursement is permissible only upon written approval of the Regional Administrator, and (2) whenever, on the basis of any information that the owner or operator is in violation of any of the closure requirements for the facility, that the Regional Administrator shall have the right to use part or all of the closure trust fund to carry out the closure requirements. The trustee shall release these funds upon receiving a copy of a properly served Notice of Violation for one or more closure violations pursuant to § 22.36 (c) and (d) of the Consolidated Rules of Practice Governing Administrative Assessment of Civil Penalties or Suspension of Permits (43 FR 34729 et. seq.). An owner/operator of a facility shall deposit into the closure trust fund, as a condition of receiving a permit, a cash deposit equal to the cost estimate for closure, multiplied by the appropriate present value factor from Table I. If site life exceeds 20 years, the present value factor can be determined by using the following formula:

$$PVF = \left( \frac{1}{1.02} \right)^{SL}$$

where:

PVF=present value factor  
SL=site life in years

TABLE I

Site Life in Years	Present Value Factor
1	.980
2	.961
3	.942
4	.924
5	.906
6	.888
7	.871
8	.853
9	.837
10	.820
11	.804
12	.788
13	.773
14	.758
15	.743
16	.728
17	.714
18	.700
19	.686
20	.673

(iii) *Reimbursement for closure costs.* When an owner or operator has ceased operations at the facility and has completed closure of the site, as required under § 250.43-7, he may apply to the Regional Administrator for return of the principal and interest in the closure trust fund. Upon determination that closure has been satisfactorily accomplished, the Regional Administrator shall release all funds accumulated in the closure trust fund.

(2) *Requirements for post-closure monitoring and maintenance.* (i) *Cost estimate.* An owner/operator of a landfill or other facility where hazardous waste is not removed as part of closure shall file with the Regional Administrator as part of his application for a permit, an estimate of the annual cost of post-closure monitoring and routine maintenance at the site in accordance with the closure regulations in § 250.43-7. The Regional Administrator shall evaluate the cost estimate, and, after such modification as may be necessary in light of his evaluation, shall give notice of acceptance of the cost estimate. This cost estimate, which will be referred to as the annual post-closure operating cost, will then be used to determine the annual cash payments during the life of the facility into a post-closure monitoring and maintenance trust fund to be used for monitoring and maintenance (as required under Section 250.43-7 of this subpart) for a period of twenty years after facility closure.

(ii) *Financial assurance for post-closure monitoring and maintenance.* An owner/operator of a landfill or other facility where hazardous waste is not removed as part of closure, shall establish a post-closure monitoring and maintenance trust fund designated, "in trust for the post-closure monitoring and maintenance of the facility." A bank or other financial institution approved by the Regional Administrator shall act as trustee of the trust fund. The trust instrument shall provide that whenever, on the basis of any information, the Regional Administrator determines that the owner or operator of the facility is in violation of any of the post-closure monitoring and maintenance requirements, the Regional Administrator shall have the right to use part of all of the fund to carry out the post-closure monitoring and maintenance for the facility. The trustee shall release these funds upon receiving a copy of a properly served Notice of Violation for one or more post-closure monitoring and maintenance violations pursuant to §§ 22.36

(c) and (d) of the Consolidated Rules of Practice Governing Administrative Assessment of Civil Penalties or the Revocation or Suspension of Permits (43-FR 34729 et. seq.). The amount of the annual cash payment shall be calculated by multiplying the annual post-closure operating costs determined under § 250.43-9(a)(2)(i) by 16.35, and dividing that product by the sum of Annuity factor from Table 2 appropriate to the period of payment.

TABLE 2

Period of Payment	Sum of Annuity Factor
1	1.000
2	2.020
3	3.060
4	4.122
5	5.204
6	6.308
7	7.434
8	8.583
9	9.755
10	10.950
11	12.169
12	13.412
13	14.680
14	15.974
15	17.293
16	18.639
17	20.012
18	21.513
19	22.841
20	24.297

(iii) *Reimbursements for post-closure costs.* One year after closure and annually, thereafter, for a period of twenty years, an owner/operator, who has carried out all necessary post-closure maintenance and monitoring requirements specified in § 250.43-7, may, upon applications to the Regional Administrator, be reimburse out of the post-closure monitoring and maintenance trust fund an amount equal to the estimated costs for monitoring and routine maintenance for that year. Request for release of funds for reimbursement must be accompanied by an itemized list of costs incurred. Upon determination that the expenditures incurred are in accordance with the approved plan and/or are justified, the Regional Administrator may release the funds. Any funds remaining in the trust at the end of the twentieth year will likewise be released to the owner/operator.

(3) *Access and default.* Whenever on the basis of any information the Regional Administrator determines that an owner/operator of a facility is in violation of any of the requirements for closure and/or for post-closure monitoring and maintenance in § 250.43-7, the Regional administrator, his officers, employees and agents, shall have the right to enter upon the facility and carry out the closure and/or the post-closure monitoring and maintenance requirements. The Regional Administrator may use part of all of the post-closure monitoring trust

fund and maintenance to carry out these requirements and shall obtain such funds by applying to the trustee.

(b) *Financial responsibility.* (1) *Financial responsibility required of owners or operators during site operation.* (i) *Amount of financial responsibility.* An owner or operator of a hazardous waste treatment, storage, or disposal facility shall have and shall maintain financial responsibility for sudden and accidental occurrences in the amount of \$5 million per occurrence, exclusive of legal defense costs, for claims arising out of injury to persons or property from the release of escape of hazardous waste into the environment from each such facility. Additionally, an owner or operator of a hazardous waste treatment, storage, or disposal facility, or a group of such facilities, shall have and shall maintain financial responsibility for non-sudden and accidental occurrences in the amount of \$5 million per occurrence with a \$10 million annual aggregate for claims arising out of injury to persons or property from the gradual or steady state release or escape of hazardous waste to the environment from such facility, or group of facilities.

(ii) *Establishment of financial responsibility.* Financial responsibility may be established by any one or a combination of the following:

- (A) Evidence of liability insurance.
- (B) Self insurance.

(C) Other evidence of financial responsibility. Evidence of financial responsibility acceptable to the Regional Administrator must be maintained during the operation of the facility. The level of self insurance shall not exceed 10 percent of equity.

(2) *Establishment of post-closure financial responsibility for hazardous waste disposal facilities.* [Reserved]

(c) *Transfer of ownership during post-closure.* If the owner/operator of a facility transfers the ownership or operation of the facility during the 20-year post-closure care period, the funds remaining in the post-closure monitoring and maintenance trust fund shall remain in that trust fund for the remainder of the post-closure care period. Any reimbursement of these funds as provided in § 250.43-9(a)(2)(iii) shall be made to the new owner/operator only if he notifies the Regional Administrator that he agrees to assume full compliance with the post-closure monitoring and maintenance requirement to § 250.43-7.

§ 250.44 Standards for storage.

(a) An owner/operator of a storage facility as defined in § 250.41, shall store the hazardous waste in either a storage tank or a storage container and shall comply with the requirements of this Section.

(b) Storage of hazardous waste shall be conducted in such a manner that no discharge of hazardous waste occurs.

(c) An owner/operator of a storage facility shall visually inspect the facility daily in accordance with the requirements of § 250.43-6 for the purpose of detecting any potential discharge of hazardous waste.

(d) An owner/operator of a storage facility may be required by the Regional Administrator to comply with all or part of the groundwater and leachate monitoring requirements of § 250.43-8, if the Regional Administrator determines that there is a potential for discharge of the hazardous material.

(e) Each storage area shall have a continuous base which is impervious to the material to be stored, and shall be designed and constructed so that any surface water run-off or spills can be contained until the waste can be removed.

(f) A hazardous waste which the Regional Administrator determines could cause the Air Human Health and Environmental Standard (§ 250.42-3) to be exceeded if it were held open to the environment, particularly with regard to volatility and toxicity, shall be stored in a storage tank(s) or a storage container(s) until the hazardous waste is disposed of, treated or incinerated in accordance with the requirements of this Subpart.

(g) Storage tanks and containers shall be of sturdy and leak-proof construction in accordance with the Occupational Safety and Health Administration's regulations for storage of flammable and combustible liquids (29 CFR Part 1910, Subpart H, § 1910.106).

(h) Storage tanks and containers shall be constructed of materials which are compatible with the hazardous waste to be contained or shall be protected by a liner compatible with the hazardous waste to be contained so that the ability of the storage tank or container to contain the waste is not impaired.

(i) A hazardous waste shall not be contained in an unwashed storage tank or container that previously held an incompatible material (see Appendix I).

(j) The identity and location of all stored hazardous waste shall be known (e.g., via labeling and recordkeeping) throughout the entire storage period.

§ 250.44-1 Storage tanks.

(a) Storage tanks which contain volatile waste shall not be vented directly to the atmosphere if they have a storage capacity in excess of 19,000 liters (5,000 gallons).

(b) All storage tanks above ground shall have a spill confinement structure(s) (e.g., dike or trench), with

a capacity equal to the entire contents of the largest storage tank, plus sufficient freeboard to allow for the containment of precipitation resulting from a 24-hour, 25-year storm.

(c) Diking requirements and operating procedures for storage tanks shall be in accordance with EPA's oil or hazardous substances pollution prevention regulations (40 CFR Part 112, Subchapter D) issued pursuant to Section 311 of the Clean Water Act.

#### § 250.44-2 Containers.

(a) If a container is not in good condition or if the contents of a storage container begin to leak, the hazardous waste in the container shall be recontainerized in a storage container(s) in good condition.

(b) A storage container holding hazardous waste shall not be opened, handled or stored in a manner which may rupture the container or cause it to leak.

(c) A storage facility which stores hazardous waste in storage containers shall have a spill confinement structure(s) (e.g., dike or trench), with a capacity equal to 10 percent of the containerized waste, plus sufficient freeboard to allow for containment of precipitation resulting from a 24-hour, 25-year storm.

(d) Storage containers holding hazardous wastes which are incompatible (see Appendix I) shall be separated from each other or protected from each other in order to prevent the wastes from mixing, should the containers break or leak.

(e) Empty combustible storage containers (e.g., fibrous and paper containers) which previously contained hazardous waste shall be:

(1) Incinerated in a facility which complies with the requirements of § 250.45-1, or

(2) Disposed in a landfill which complies with the requirements of § 250.45-2.

(f) Empty non-combustible storage containers (e.g., metal and glass containers), which previously contained hazardous waste, shall be:

(1) Cleaned by removing hazardous waste residuals at a permitted facility, and

(i) Transported to a drum reconditioner; or

(ii) Transported to a metal or glass recovery facility as scrap for resource recovery; or

(2) Transported to a permitted drum reconditioner, with appropriate manifest; or

(3) Reused with the same type of waste previously contained, or with another compatible waste provided such reuse is lawful under currently

applicable U.S. DOT regulations, including those set forth in 49 CFR 173.28.

(g) Paper bags contaminated with hazardous waste shall be stored in closed secondary containers.

(h) All containers received at hazardous waste facilities shall be in compliance with § 250.25 (containers) of Subpart B.

#### § 250.45 Standards for treatment/disposal.

(a) Where practical, disposal of hazardous waste shall be avoided and alternatives such as destruction, treatment to render the waste non-hazardous, or treatment for purposes of resource recovery and reuse shall be employed.

(b) All facilities which dispose of discrete radioactive wastes shall be licensed by the U.S. Nuclear Regulatory Commission, or an Agreement State.

(c) An owner/operator of a facility shall not treat or dispose of hazardous waste in a landfill, surface impoundment, basin, or landfarm if the waste has any one of the following characteristics:

(i) Ignitable waste, as defined in § 250.13(a), Subpart A;

(ii) Reactive waste, as defined in § 250.13(c), Subpart A;

(iii) Contains chemical groups which are incompatible with wastes in the facility with which they may become mixed (see Appendix I); or

(iv) Volatile waste.

NOTE.—A landfill, surface impoundment, basin, or landfarm facility may be used to treat or dispose of ignitable, reactive, volatile, or incompatible waste provided that the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that such treatment or disposal will not: (1) contribute any airborne contaminant to the atmosphere such that concentrations above the source have the potential: (i) to exceed permissible exposure levels for that airborne contaminant promulgated in 29 CFR 1910.1000 (see Appendix III) pursuant to the Occupational Safety and Health Act of 1970, or (ii) to contribute two or more listed airborne contaminants in a manner which causes the sum of the following expression to exceed unity:

$$E_m = \frac{C_1}{L_1} + \frac{C_2}{L_2} + \dots + \frac{C_n}{L_n}$$

Where:

$E_m$  is the equivalent exposure of a mixture of airborne contaminants,  $C$  is the concentration of a particular contaminant,  $L$  is the exposure limit for that contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3), and (2) damage the structural integrity of the landfill, surface impoundment, or basin, or

affect the attenuation capacity of a landfarm, through heat generation, fires, or explosive reactions.

#### § 250.45-1 Incineration.

(a) An owner/operator of an incinerator shall comply with the requirements of this Section when burning hazardous waste.

(b) *Trial burns.* (1) The owner/operator shall conduct a trial burn for each hazardous waste which is significantly different in physical and chemical characteristics from any previously demonstrated under equivalent conditions. The trial burn shall include as a minimum the following determinations:

(i) An analysis of the hazardous waste for concentrations of halogens and principal hazardous components;

(ii) An analysis of the ash residues and scrubber effluent for the principal hazardous components;

(iii) An analysis of the exhaust gas for the concentrations of the principal hazardous components, hydrogen halides, CO, CO<sub>2</sub>, O<sub>2</sub>, and total particulates;

(iv) An identification of sources of fugitive emissions and their means of control;

(v) A measurement of combustion temperature and computation of residence time;

(vi) A computation of combustion efficiency and destruction efficiency;

(vii) A computation of scrubber efficiency in removing halogens;

(2) The results from each trial burn shall be submitted to the Regional Administrator.

(c) *Monitoring.* The owner/operator shall monitor and record the following in each trial burn and each operational burn:

(1) Combustion temperature;

(2) Carbon monoxide and oxygen concentrations in the exhaust gas on a continuous basis, and

(3) The rate of hazardous waste, fuel, and excess air fed to the combustion system at regular intervals of no longer than 15 minutes.

(d) *Combustion criteria.* (1) The incinerator shall operate at greater than 1000° C combustion temperature, greater than 2 seconds retention time, and greater than 2 percent excess oxygen during incineration of hazardous waste, unless the waste is hazardous because it contains halogenated aromatic hydrocarbons, in which case the incinerator shall operate at greater than 1200° C combustion temperature, greater than two seconds retention time, and greater than 3 percent

excess oxygen during incineration of the hazardous waste.

(2) The incinerator shall be operated at a combustion efficiency equal to or greater than 99.9 percent, as defined in the following equation:

$$CE = \frac{C_{CO_2}}{C_{CO_2} + C_{CO}} \times 100$$

Where:

CE=combustion efficiency  
 $C_{CO_2}$ =concentration of CO<sub>2</sub> in exhaust gas  
 $C_{CO}$ =concentration of CO in exhaust gas

Incinerators that burn waste that is hazardous only because it is listed in § 250.14(b)(1) are exempt from this required.

NOTE To (b) (1) AND (2).—Incinerators may operate at other conditions of temperature, retention time, and combustion efficiency if the facility owner/operator can demonstrate that an equivalent degree of combustion will be provided under alternate combustion criteria to the conditions prescribed above.

(3) The incinerator shall be operated with a functioning device to cut off automatically waste feed to the incinerator when significant changes occur in flame combustion temperature, excess air, or scrubber water pressure.

(e) *Destruction and emission control criteria.* (1) The incinerator shall be designed, constructed, and operated to maintain a destruction efficiency of 99.99 percent as defined in the following equation:

$$DE = \left( \frac{W_{in} - W_{out}}{W_{in}} \right) \times 100$$

Where:

DE=destruction efficiency  
 $W_{in}$ =mass feed rate of principal toxic components of waste going into the incinerator (g/min)  
 $W_{out}$ =mass emissions rate of principal toxic components in waste in the incinerator combustion zone (g/min).

Incinerators that burn waste that is hazardous only because it is listed in § 250.14(b)(1) are exempt from this requirement.

(2) An incinerator used to thermally degrade hazardous waste containing more than 0.5 percent halogens shall be equipped with emission control equipment capable of removing 99 percent of the halogens from the exhaust gases.

(3) The incinerator shall be operated in a manner that assures that emissions of particulate matter do not exceed 270 milligrams per dry standard cubic meter (0.12 grains per dry standard cubic foot) at zero excess air. Compliance with this requirement may be achieved by having particulate emissions which, when corrected to 12 percent CO<sub>2</sub> by the formula below, are less than 180 milligrams per standard cubic meter (0.08 grains per dry standard cubic foot).

$$PE_c = PE_m \times \frac{C_s}{C_m \times 1.5}$$

Where:

$PE_c$ =corrected particulate emissions, mg/m<sup>3</sup> (gr/dscf)  
 $PE_m$ =measured particulate emissions, mg/m<sup>3</sup> (gr/dscf)  
 $C_s$ =stoichiometric CO<sub>2</sub> concentration, ppm  
 $C_m$ =measured CO<sub>2</sub> concentration, ppm

(4) The incinerator shall be designed, constructed, and operated so that fugitive emissions of unburned hazardous waste and combustion products are controlled.

§ 250.45-2 Landfills.

(a) *Site Selection.*

(1) A landfill shall be located, designed, constructed, and operated to prevent direct contact between the landfill and navigable water.

(2) A landfill shall be located, designed, and constructed so that the bottom of its liner system or natural in-place soil barrier is at least 1.5 meters (5 feet) above the historical high water table.

NOTE.—The bottom of any liner system or natural in-place soil barrier may be located less than 1.5 meters (5 feet) above the historical high water table, provided the owner/operator can demonstrate, to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that no direct contact will occur between the landfill and the water table and a leachate monitoring system as required by § 250.43-8 can be adequately installed and maintained in the lesser space.

(3) A landfill shall be at least 150 meters (500 feet) from any functioning public or private water supply or livestock water supply.

NOTE.—A landfill may be less than 150 meters (500 feet) from any functioning public or private water supply or livestock water supply, provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that:

(i) No direct contact will occur between the landfill and any functioning public or private water supply or livestock water supply;

(ii) No mixing of the landfill leachate (including groundwater or surface water contaminated with leachate) with the public or private water supply or livestock water supply will occur; and

(iii) A groundwater monitoring system as required by § 250.43-8 has been installed and is being adequately maintained.

(b) *Construction and operation.* (1) A landfill shall be located, designed, constructed, and operated to minimize erosion, landslides, and slumping.

(2) A landfill shall be located, designed, constructed, and operated so that its liner system or natural in-place soil barrier is compatible with all of the waste to be landfilled.

(3) The exact location of each hazardous waste and the dimensions of each cell with respect to permanently surveyed bench marks shall be recorded. The contents of each cell shall also be recorded. These records shall be handled as specified in § 250.43-5(b).

(4) Waste, containerized or non-containerized, that is incompatible (see Appendix I) shall be disposed of in separate landfill cells.

(5) Each container of liquid hazardous waste shall be surrounded by an amount of sorbent inert material capable of absorbing all of the liquid contents of the container.

(6) The following hazardous waste shall not be disposed in a landfill:

- (i) Ignitable waste, as defined in § 250.13(a) of Subpart A;
- (ii) Reactive waste, as defined in § 250.13(c) of Subpart A;
- (iii) Volatile waste;

NOTE.—See Note in § 250.45(c).

(iv) Bulk liquids, semi-solids, and sludges.

NOTE.—Bulk liquids, semi-solids, and sludges may be disposed of at a landfill provided such waste is pretreated and/or stabilized (e.g., chemically fixed, evaporated, mixed with dry inert absorbant), or treated and/or stabilized in the landfill (e.g., mixed with municipal refuse at acceptable ratios) to reduce its liquid content or increase its solid content so that a non-flowing consistency is achieved to eliminate the presence of free liquids prior to final disposal in a landfill.

(7) Diversion structures (e.g., dikes, drainage ditches) shall be constructed such that surface water runoff will be prevented from entering the landfill.

NOTE.—Diversion structures may not be necessary provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to



Subpart E, that the landfill facility is located so that the local topography will prevent surface water runoff from entering the facility.

(8) Surface water which has been in contact with the active portions of a landfill shall be collected and treated or disposed of as a hazardous waste in accordance with requirements in this Subpart unless it is analyzed and found not to be hazardous waste as identified or listed in Subpart A or it is collected and discharged into a navigable water in compliance with a NPDES permit issued under the Clean Water Act.

(9) Where gases are generated within the landfill, a gas collection and control system shall be installed to control the vertical and horizontal escape of gases from the landfill.

NOTE.—Gas collection and control systems shall not be required provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that gases will not be generated in the landfill or that gases generated will not be in violation of the air contaminant limits specified in the Note associated with § 250.45(c) and will not create a flammable or explosive atmosphere.

(10) A minimum of 15 centimeters (6 inches) of cover material shall be applied daily on active portions of a landfill. Active portions which will not have additional waste placed on them for at least one week shall be covered with 30 centimeters (12 inches) of cover material.

NOTE.—An owner/operator may use covers of different thicknesses and/or apply them at different frequencies if he can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that the possibility of fire or explosion or the harboring, feeding, and breeding of land burrowing animals and vectors will be controlled to an equivalent degree.

(11) In areas where evaporation exceeds precipitation by 20 inches or more and where natural geologic conditions allow, a landfill shall have a natural in-place soil barrier on the entire bottom and sides of the landfill. This barrier shall be at least 3 meters (10 feet) in thickness and consist of natural in-place soil which has a permeability of less than or equal to  $1 \times 10^{-7}$  cm/sec. and meets the requirements of § 250.45(b)(14).

NOTE.—A natural in-place soil barrier using natural in-place soils of different thicknesses and permeabilities may be used, provided the barrier has a thickness greater than or equal to 1.5 meters (5 feet), and provided that the owner/operator of the landfill can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that it will provide equivalent containment of leachate.

(12) An owner/operator of a landfill using the design in paragraph (b)(11) or any similar design which does not

have a leachate collection system shall demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that liquids will not accumulate in the landfill to the extent that they may be discharged to the surface or to groundwater.

(13) In areas where climatic and natural geologic conditions do not allow meeting the requirements of paragraph (b)(11), a landfill shall have either one of the following liner systems covering the entire bottom and sides of the landfill:

(i) *Design I.* The liner system shall have a slope of at least 1 percent at all points and be connected at all low points to one or more leachate collection sumps, (which meet the specifications in paragraph (b)(17)), so that leachate formed in the landfill will flow by gravity into the leachate collection sump(s) from which the leachate can be removed and treated or disposed of as specified herein. The liner system shall consist of:

(A) A soil liner which is at least 1.5 meters (5 feet) in thickness and composed of natural in-place soil or emplaced soil which has a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec. and meets the requirements of paragraph (b)(14); and

(B) A leachate collection and removal system overlying the soil liner which is at least 30 centimeters (12 inches) in thickness and composed of permeable soil capable of permitting leachate to move rapidly through the system and into the leachate collection sump(s).

(iii) *Design II.* The liner system shall have a slope of at least 1 percent at all points and be connected at all low points to one or more leachate collection sumps (which meet the specifications of paragraph (b)(17)), so that leachate formed in the landfill will flow by gravity into the leachate collection sump(s) from which the leachate can be removed and treated or disposed of as specified herein. The landfill liner system shall consist of:

(A) A leachate detection and removal system, placed on the natural base of the landfill, which shall consist of a minimum of 15 centimeters (6 inches) of permeable soil capable of permitting leachate to move rapidly through the system and into the leachate collection sumps;

(B) A membrane liner system overlying the leachate detection and removal system composed of a 15 centimeter (6 inch) layer of clean permeable sand or soil overlaid with a synthetic membrane liner which meets the specifications in paragraph (b)(17) and which is overlaid with a 15 centimeter (6 inch) layer of clean permeable sand or soil;

(C) A soil liner overlying the membrane liner system which is at least 1 meter (3 feet) in thickness and composed of soil which has a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec. and meets the requirements of paragraph (b)(14); and

(D) A leachate collection and removal system overlying the soil liner which is at least 30 centimeters (12 inches) in thickness and composed of permeable soil capable of permitting leachate to move rapidly through the system and into the leachate collection sumps.

NOTE.—A landfill may use a different liner system than the two described above provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that the alternate liner system includes a liner and a leachate collection and removal system that provides equivalent or greater leachate containment, collection, and removal.

(14) The soils used in a soil liner or natural in-place soil barrier shall meet the following minimum criteria:

(i) Be classified under the Unified Soil Classification System CL, CH, SC and OH (ASTM Standard D2487-69),

(ii) Allow greater than 30 percent passage through a no. 200 sieve (ASTM Test D1140),

(iii) Have a liquid limit equal to or greater than 30 units (ASTM Test D423),

(iv) Have plasticity greater than or equal to 15 units (ASTM Test D424),

(v) Have a pH of 7.0 or higher (see Appendix IV), and

(vi) Have a permeability not adversely affected by anticipated waste.

NOTE.—Soil not meeting the above criteria may be used provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that such soil will provide equivalent or greater structural stability and waste containment and attenuation, and will not be adversely affected by the anticipated waste.

(15) A synthetic membrane liner shall meet the following minimum criteria:

(i) Be of adequate strength and thickness to insure mechanical integrity and have a minimum thickness of 20 mils;

(ii) Be compatible with the waste to be landfilled;

(iii) Be resistant to attack from soil bacteria and fungus;

(iv) Have ample weather resistance to withstand the stress of extreme heat, freezing, and thawing;

(v) Have adequate tensile strength to elongate sufficiently and withstand the stress of installation and/or use of machinery and equipment;

(vi) Be of uniform thickness, free from thin spots, cracks, tears, blisters, and foreign particles;

(vii) Be placed on a stable base; and  
(viii) Have a permeability less than or equal to  $1 \times 10^{-12}$  cm/sec or its equivalent.

(16) A landfill overlying an underground drinking water source shall have a groundwater monitoring system and a leachate monitoring system as specified in § 250.43-8.

(17) A leachate collection sump (as required in the liner systems specified in paragraph (b)(13)) shall be designed and constructed:

(i) Of materials both compatible with and impermeable to the leachate formed in the landfill;

(ii) So that the sump is accessible for removal of leachate if the sump pump becomes inoperative and/or the stand pipe for removal of leachate becomes damaged; and

(iii) With a volume equal to or greater than three-months expected volume of leachate but no less than 1,000 gallons.

(18) The owner/operator shall remove leachate from a leachate collection sump as frequently as necessary to maintain gravity flow in the leachate collection and removal system and shall check the leachate collection sump at least monthly to assure compliance with this requirement.

(19) Landfill liner systems and natural in-place soil barriers shall not be placed over earth materials exhibiting a permeability of greater than  $1 \times 10^{-4}$  cm/sec.

(c) *Closure.* (1) At closure, the owner/operator of a landfill shall place a final cover over the landfill. This final cover shall consist of at least 15 centimeters (6 inches) of soil with a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec which meets the criteria of § 250.45-2(b)(14), underlying 45 centimeters (18 inches) of soil capable of supporting indigenous vegetation. The top 15 centimeters (6 inches) of this cover shall be topsoil.

**NOTE.**—A final cover using different thicknesses and permeabilities may be used provided the owner/operator can demonstrate to the Regional Administrator that it will provide equivalent control of infiltration of water, equivalent control of sublimation or evaporation of harmful pollutants into the air, and equivalent erosion control. The owner/operator must also demonstrate that the final cover will support indigenous vegetation.

(2) Where trees or other deep-rooted vegetation are to be planted on the completed landfill, the final cover shall consist of the 15 centimeter (6 inch) soil layer specified in paragraph (c)(1) underlying at least 1 meter (3 feet) of soil capable of supporting the deep-rooted vegetation and indigenous vegetation.

**NOTE.**—The upper layer soil thickness for deep-rooted vegetation may be less than 1 meter (3 feet) provided the owner/operator

can demonstrate to the Regional Administrator that the roots of the vegetation will not penetrate the 6-inch clay cover.

(3) The final grade of the final cover shall not exceed 33 percent. Where final grades exceed 10 percent, horizontal terraces shall be constructed. Terraces shall be of sufficient width and height to withstand a 24-hour, 25-year storm. A terrace shall be placed at every 10 feet of rise in elevation when the slope is less than 20 percent and at every 20 feet or rise in elevation when the slope is greater than 20 percent.

**NOTE.**—The final grade may be of different design and slope provided the owner/operator can demonstrate to the Regional Administrator that water will not pool on the final cover and that erosion will be minimized.

(d) *Post-closure care.* (1) During the post-closure period, which shall continue at the landfill for a period of at least 20 years (see § 250.43-7), the owner-operator of the landfill:

(i) Shall maintain the soil integrity, slope, and vegetative cover of the final cover and all diversion and drainage structures;

(ii) Shall maintain the groundwater and leachate monitoring systems and collect and analyze samples from these systems and collect and analyze samples from these systems in the manner and frequency specified in § 250.43-8;

(iii) Shall maintain surveyed bench marks;

(iv) Shall maintain and monitor the gas collection and control system where such a system is installed to control the vertical and horizontal escape of gases; and

(v) Shall restrict access to the landfill as appropriate for its post-closure use.

**NOTE.**—The owner or operator of a landfill may request that certain post-closure requirements be discontinued earlier than 20 years after closure. The facility owner or operator shall submit information to the Regional Administrator to indicate that such post-closure care need not continue; (e.g., no leaks have been detected, technology has advanced, alternate disposal techniques are to be employed.) The Regional Administrator shall have the discretion to allow discontinuance of one or more of these post-closure requirements.

(2) No buildings intended for habitation shall be constructed over a landfill where radioactive waste as listed in Subpart A has been disposed.

#### § 250.45-3 Surface impoundments.

(a) *Site selection.* (1) A surface impoundment shall be located, designed, constructed, and operated to prevent direct contact between the surface impoundment and navigable water.

(2) A surface impoundment shall be located, designed, and constructed so that the bottom of its liner system or

natural in-place soil barrier is at least 1.5 meters (5 feet) above the historical high water table.

**NOTE.**—The bottom of any liner system or natural in-place soil barrier may be located less than 1.5 meters (5 feet) above the historical high water table provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that no direct contact will occur between the surface impoundment and the water table, and a leachate monitoring system as required in § 250.43-8 can be adequately installed and maintained in the lesser space.

(3) A surface impoundment shall be located at least 150 meters (500 feet) from any functioning public or private water supply or livestock water supply.

**NOTE.**—A surface impoundment may be located less than 150 meters (500 feet) from any functioning public or private water supply or livestock water supply provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that:

(i) No direct contact will occur between the surface impoundment and any functioning public or private water supply or livestock water supply;

(ii) No mixing of the leachate (including groundwater or surface water contaminated with leachate) with the public or private water supply or livestock water supply will occur; and

(iii) A groundwater monitoring system as required by § 250.43-8 has been installed and is being adequately maintained.

(4) A surface impoundment shall be located, designed, constructed, and operated to minimize landslides, slumping, and erosion.

(b) *Hazardous waste suitable for surface impoundments.* (1) A surface impoundment shall not be used to contain hazardous waste which is:

(i) Detrimental to any material being used as a barrier to the waste movement from the surface impoundment,

(ii) Ignitable waste, as defined in § 250.13(a) of Subpart A,

(iii) Reactive waste, as defined in § 250.13(c) of Subpart A, or

(iv) Volatile waste.

**NOTE.**—(Relative to ii, iii, and iv) see Note associated with § 250.45(c).

(2) Hazardous waste which is incompatible (see Appendix I) shall not be emplaced together in a surface impoundment.

(3) All hazardous waste shall be tested, prior to placement in a surface impoundment, for compatibility with the intended liner materials to determine whether it will have any detrimental effect (e.g., cause cracks, dissolution, decrease mechanical strength, or increase permeability) on the soils or lining materials used to prevent leakage from the surface impoundment.

(c) *Design and construction.* (1) A surface impoundment shall be de-

signed and constructed so as to be capable of preventing discharges or releases to the groundwater or navigable water.

(2) Where natural geologic conditions allow, a surface impoundment shall have a natural in-place soil barrier on the entire bottom and sides of the impoundment. This barrier shall be at least 3 meters (10 feet) in thickness and composed of natural in-place soil which meets the specifications of paragraph (c)(4).

**NOTE.**—An owner/operator of a surface impoundment may use a natural in-place soil barrier of different thicknesses and different specifications if the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that equivalent or greater waste containment can be achieved. However, under no circumstances shall the thickness of the natural in-place soil barrier be less than 1.5 m (5 feet), or its permeability be greater than  $10^{-7}$  cm/sec.

(3) Where geologic conditions do not allow use of the design in paragraph (c)(2), a surface impoundment shall have a liner system covering the entire bottom and sides of the impoundment. This liner system shall consist of top liner, a bottom liner and a leachate detection system which meet the following specifications:

(i) The top liner shall consist of emplaced soil at least 30 centimeters (12 inches) in thickness which meets the criteria in paragraph (c)(4), or an artificial liner which meets the criteria in paragraph (c)(5).

(ii) The bottom liner shall consist of natural in-place soil or emplaced soil which meets the criteria in paragraph (c)(4) and is at least 1.5 meters (5 feet) in thickness, or an artificial liner which meets the criteria in (c)(5).

(iii) The leachate detection system shall be a gravity flow drainage system installed between the top and bottom liners and shall be capable of detecting any leachate that passes through the top liner. Provisions shall be made for pumping out any leachate that passes through the top liner and for removal of noxious gases that occur in the system.

**NOTE.**—An owner/operator may use a different design if he can demonstrate that an equivalent or greater degree of waste containment is achieved. The Regional Administrator shall take into account the length of time the surface impoundment has been in existence, projected facility life, and artificial liner, natural in-place soil, or emplaced soil permeability and thickness when arriving at a decision regarding whether an equivalent degree of containment exists. In the case of existing facilities, the facility owner/operator may conduct leachate (zone of aeration) monitoring to determine whether any significant increase in the background levels of chemical species has occurred. If no significant increase is observed, the design shall be considered to provide the same or greater degree of performance.

(4) Soils used for surface impoundment liners or natural in-place soil barriers shall:

(i) Be classified under the Unified Soil Classification Systems as CL, CH, SC, or OH, (ASTM Standard D2487-69);

(ii) Allow more than 30 percent passage through a No. 200 sieve (ASTM Test D1140);

(iii) Have a liquid limit equal to or greater than 30 (ASTM Test D423);

(iv) Have a plasticity index equal to or greater than 15 (ASTM Test D424);

(v) Have a pH of 7.0 or higher (See Appendix IV);

(vi) Have a permeability equal to or less than  $1 \times 10^{-7}$  cm/sec. (ASTM Test D2434); and

(vii) Have a permeability not adversely affected by the waste to be placed in the impoundment.

**NOTE.**—Soil not meeting the above criteria may be used provided that the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that such soil will provide equivalent or greater structural stability and waste containment properties and will not be adversely affected by the waste to be placed in the impoundment.

(5) Artificial liners for surface impoundments (e.g., concrete, plastic) shall:

(i) Be of sufficient strength to insure mechanical integrity;

(ii) Have a minimum thickness of 30 mils;

(iii) Be compatible with the waste to be placed in the impoundment;

(iv) Have a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec;

(v) Have an expected service life at least 25 percent longer than the expected time of facility usage;

(vi) Be placed on a stable base;

(vii) Satisfactorily resist attack from ozone, ultraviolet rays, soil bacteria, and fungus;

(viii) Have ample weather resistance to withstand the stress of freezing and thawing;

(ix) Have adequate tensile strength to elongate sufficiently and withstand the stress of installation and/or the use of machinery or equipment;

(x) Resist laceration, abrasion and puncture from any matter that may be contained in the fluids it will hold;

(xi) Be of uniform thickness, free of thin spots, cracks, tears, blisters, and foreign particles; and

(xii) Be easily repaired.

(6) To prevent their rupture, all artificial liners in a surface impoundment where mechanical equipment is used for operation (e.g., sludge dredging and collecting) shall have a protective cover of selected clean earth material, not less than 45 centimeters (18 inches) thick, placed directly on top of the liner.

(7) A surface impoundment shall have a groundwater monitoring system and a leachate monitoring system that meet the specifications in § 250.43-8.

(8) All surface impoundment dikes shall be designed and constructed in a manner that will prevent discharge or release of waste from the facility, both horizontally and vertically.

(9) All earthen dikes at the facility shall be constructed of clay-rich soil with a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec.

(10) All earthen dikes shall have an outside protective cover (e.g., grass, shale, rock) to minimize erosion by wind and water.

(11) Those surface impoundments which are intended to be closed without removing the hazardous waste shall meet the landfill requirements under Section 250.45-2.

(d) *Operation and maintenance.* (1) A surface impoundment shall be operated and maintained so that discharges or releases to groundwater and navigable water do not occur.

(2) The freeboard maintained in a surface impoundment shall be capable of containing rainfall from a 24-hour, 25-year storm but shall be no less than 60 centimeters (2 feet).

(3) Records shall be kept of the contents and location of each surface impoundment. These records shall be maintained as specified in § 250.43-5(b).

(4) The integrity of the natural in-place soil barrier or the liner system installed in a surface impoundment shall be maintained until closure of the impoundment. The liner system or natural in-place soil barrier shall be repaired immediately upon detection of any failure (e.g., liner puncture).

(5) Surface impoundment dikes shall be visually inspected daily, as specified under Section 250.43-6, for the purpose of detecting and correcting any deterioration. Any maintenance or corrective action necessary to restore the dike to its original condition shall be accomplished expeditiously.

(6) Any system provided for detecting the failure of a liner system or natural in-place soil barrier shall be visually inspected daily, as specified in § 250.43-6, to insure that it is operating properly for the purpose intended.

(e) *Closure and post-closure.* (1) Upon final close-out, all hazardous waste and hazardous waste residuals shall be removed from the surface impoundment, if the impoundment does not meet the landfill requirements under § 250.45-2, and disposed of as hazardous waste pursuant to the requirements of this Part.

(2) Upon final close-out of a surface impoundment which meets the criteria for landfills under § 250.45-2, all haz-

ardous waste and hazardous waste residuals shall be:

(i) Removed and disposed as hazardous waste pursuant to the requirements of this Part, or

(ii) Treated in the impoundment pursuant to the note following § 250.45-2(b) (6) (iv), and then the impoundment shall be closed according to the closure requirements for landfills under § 250.45-2(c).

(3) Emptied surface impoundments shall be filled with an inert fill material and seeded with a suitable grass or ground cover crop, or converted to some other acceptable use that meets the requirement under § 250.43-7.

(4) Those surface impoundments which were closed as landfills shall meet all post-closure requirements for landfills under § 250.45-2(d).

#### § 250.45-4 Basins.

(a) A basin shall be constructed of impermeable materials of sufficient strength and thickness to ensure mechanical integrity and to prevent the discharge of waste to navigable waters or groundwater.

(b) A basin shall not be used to contain hazardous waste which is:

(1) Detrimental to the basin's construction materials;

(2) Ignitable waste, as defined in § 250.13(a) of Subpart A;

(3) Reactive waste, as defined in § 250.13(c) of Subpart A; or

(4) Volatile waste.

NOTE.—With respect to (b) (2, 3 and 4), see Note associated with § 250.45(c).

(c) Hazardous waste which is incompatible (see Appendix I) shall not be placed together in a basin.

(d) A hazardous waste shall be tested prior to placement in a basin to determine whether it will have any detrimental effect (e.g., cause dissolution or corrosion, increase permeability, decrease mechanical strength) on materials used for construction of the basin.

(e) The materials used for construction of basins shall be compatible with the hazardous waste and treatment chemicals to be used under expected operating conditions (i.e., temperature, pressure) or shall be protected by a liner compatible with the hazardous waste and treatment chemicals to be used under expected operating conditions.

(f) A basin shall be monitored or visually inspected daily in accordance with the requirements under § 250.43-6 for leaks, corrosion, cracks, or other damages. Any damage detected shall be repaired immediately.

(g) A basin shall have a groundwater monitoring system meeting the specifications of § 250.43-8.

NOTE.—A basin does not need a groundwater monitoring system if the facility

owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that any leaking can be detected by visual inspection or other means.

(h) At final closure, all hazardous waste and hazardous waste residues shall have been removed from a basin and disposed of as hazardous waste pursuant to the requirements of Subparts B, C, and D.

#### 250.45-5 Landfarms.

(a) *Hazardous waste not amenable to landfarming.* The following hazardous waste shall not be landfarmed:

(1) Ignitable waste, as defined in § 250.13(a) of Subpart A;

(2) Reactive waste, as defined in § 250.13(c) of Subpart A;

(3) Volatile waste;

(4) Waste which is incompatible when mixed (see Appendix I).

NOTE.—See Note associated with § 250.45(c).

(b) *General requirements.* (1) A landfarm shall be located, designed, constructed, and operated to prevent direct contact between the treated area and navigable water.

(2) A landfarm shall be located, designed, constructed, and operated to minimize erosion, landslides, and slumping in the treated area.

(3) A landfarm shall be located, designed, constructed and operated so that the treated area is at least 1.5 meters (5 feet) above the historical high water table.

NOTE.—The treated area may be located less than 1.5 meters (5 feet) above the historical high water table if the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that no direct contact will occur between the treated area and the water table.

(4) The treated area of a landfarm shall be at least 150 meters (500 feet) from any functioning public or private water supply or livestock water supply.

NOTE.—The treated area of a landfarm may be less than 150 meters (500 feet) from any functioning public or private water supply or livestock water supply, provided the facility owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that:

(i) No direct contact will occur between the treated area of the landfarm and any functioning public or private water supply or livestock water supply;

(ii) No migration of hazardous constituents from the soil in the treated area of the landfill to any public or private water supply or livestock water supply will occur; and

(iii) A soil monitoring system as specified in § 250.45-5(e) has been installed and is being adequately maintained.

(5) A landfarm shall be located on an area that has fine grained soils (i.e., more than half the soil particles are

less than 73 microns in size which are of one of the following types, as defined by the Unified Soil Classification System (ASTM Standard D 2487-69): OH—organic clays of medium to high plasticity; CH—inorganic clays of high plasticity, fat clays; MH—inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts; CL—inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays; OL—organic silts and organic silt-clays of low plasticity.

NOTE.—A landfarm may be located on an area with soil types other than those specified above provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that the alternative soil types will prevent hazardous constituents from vertically migrating a distance that exceeds three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater.

(c) *Site preparation.* (1) Surface slopes of a landfarm shall be less than 5 percent, to minimize erosion in the treated area by waste or surface run-off, but greater than zero percent to prevent the waste or water from ponding or standing for periods that will cause the treated area to become anaerobic.

NOTE.—Surface slopes of the landfarm may be greater than 5 percent provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that such slopes will not result in erosion caused by waste or surface run-off in the treated area.

(2) Caves, wells (other than active monitoring wells), and other direct connections to the subsurface environment within the treated area of a landfarm, or within 30 meters (100 feet) thereof, shall be sealed.

(3) Soil pH in the zone of incorporation shall be equal to or greater than 6.5 (see Appendix IV).

NOTE.—Soil pH in the zone of incorporation may be less than 6.5 provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that hazardous constituents, especially heavy metals, will not migrate vertically a distance that exceeds three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater.

(d) *Waste application and incorporation.* (1) Waste application and incorporation practices shall prevent the zone of incorporation from becoming anaerobic.

(2) Waste shall not be applied to the soil when it is saturated with water.

NOTE.—Waste may be applied to the soil when it is saturated with water provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that the soil-waste mixture will remain aerobic and that hazardous constituents, especially heavy metals, will not migrate vertically a distance

that exceeds three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater.

(3) Waste shall not be applied to the soil when the soil temperature is less than or equal to 0° C.

(4) The pH of the soil-waste mixture in the zone of incorporation shall be equal to or greater than 6.5 and maintained until the time of facility closure.

NOTE.—The pH of the soil-waste mixture in the zone of incorporation may be less than 6.5 provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that hazardous constituents, especially heavy metals, will not vertically migrate a distance that exceeds three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater.

(5) Supplemental nitrogen and phosphorous added to the soil of the treated area, for the purpose of increasing the rate of waste biodegradation, shall not exceed the rates of application recommended for agricultural purposes by the United States Department of Agricultural or Agricultural Extension Service.

(e) *Soil monitoring.* (1) Background soil conditions shall be determined by taking one soil core per acre in the area to be treated. The depth of the soil core shall be three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater. The bottom one-third of the soil core shall be quantitatively analyzed for those constituents known or expected to be in the waste which make it hazardous. At new facilities, soil cores shall be taken and analyzed prior to beginning operation. At existing facilities, background soil cores shall be taken and analyzed within six months after the effective date of these regulations.

(2) Soil conditions in the treated area of a landfarm shall be determined by taking one soil core per acre, semi-annually. The depth of the soil core shall be three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater. The bottom one-third of the soil core shall be quantitatively analyzed for the constituents in the waste which make it hazardous.

NOTE.—Soil monitoring may be conducted by taking less than one soil core per acre and/or by monitoring less frequently than semi-annually, provided the owner/operator can demonstrate to the Regional Administrator, at the time a permit is issued pursuant to Subpart E, that hazardous constituents, especially heavy metals, will be detected before vertically migrating a distance that exceeds three times the depth of the zone of incorporation or 30 centimeters (12 inches), whichever is greater.

(3) If soil monitoring shows that the concentration of a hazardous constituent in the bottom one-third of the soil core has significantly exceeded the background levels established in accordance with paragraph (e)(1), the owner/operator shall: (i) Notify the Regional Administrator within seven days;

(ii) Determine, by soil monitoring, the areal extent of vertical contaminant migration in the soil; and

(iii) Discontinue all landfarming in the contaminated area, as determined in (ii), until corrective measures can be taken.

(f) *Growth of food-chain crops.* Food-chain crops shall not be grown on the treated area of a landfarm.

(g) *Closure.* (1) A landfarm shall be designed and operated so that, by the time of closure, the soil of the treated area(s):

(i) Is returned to its pre-existing condition, as established in paragraph (e)(1) if the facility began operation after promulgation of this requirement (i.e., a new facility).

(ii) Is returned to equivalent pre-existing condition, as determined by soil analysis of similar local soils that have not had hazardous waste applied to them, if the facility began operation prior to the promulgation of this requirement (i.e., an existing facility). Soil analysis of similar local soils shall not be required at existing facilities if background soil data are available and those data establish background conditions for the treated area(s).

(2) Soil of the treated area(s) of a new or existing facility that does not comply with paragraph (g)(1)(i) or (ii), respectively, shall be analyzed to determine if it meets the characteristics of a hazardous waste as defined in Subpart A. In the event the soil is determined to be a hazardous waste, it shall be removed and managed as a hazardous waste in accordance with all applicable requirements of this Part.

NOTE.—The soil at a landfarm, if determined to be a hazardous waste, need not be removed provided the owner/operator can demonstrate to the Regional Administrator that, because of its special design and/or because of its location, the landfarm provides long term integrity and environmental protection equivalent to a landfill as specified in § 250.45-2. In the event of such a showing, the owner/operator shall comply with the applicable closure and post-closure provisions of § 250.43-7 and 250.45-2(c and d).

§ 250.45-6 Chemical, physical, and biological treatment facilities.

(a) The materials used in construction of the treatment facility shall be compatible, under expected operating conditions (e.g., temperature, pressure), with the hazardous waste and any treatment chemicals or reagents used in the treatment process.

(b) The hazardous waste shall be analyzed, as appropriate, prior to selection of a treatment technique to determine:

(1) The proper treatment technique, the proper feed rates of treatment chemicals or reagents, and the proper operating conditions (e.g., temperature, pressure, flow rate);

(2) If the waste or treatment chemicals or reagents will have any detrimental effect (e.g., cause corrosion, dissolution, saltings or scallings) on the materials used for construction;

(3) If the waste contains any components or contaminants which may interfere with the intended treatment process (e.g., biological treatment, solidification, adsorption processes) or decreases the effectiveness of the treatment;

(4) If the waste contains components or contaminants which may cause the uncontrolled release of toxic gases or fumes (e.g., H<sub>2</sub>S, HCN) during the intended treatment;

(5) If the waste contains components or contaminants which may form highly toxic components with the treatment chemicals or reagents (e.g., halogenated hydrocarbons) during the intended treatment.

NOTE.—The analyses of hazardous waste may be omitted provided the owner/operator can demonstrate to the Regional Administrator that the information provided in the manifest is adequate to make the determinations required in paragraph (b), or the facility owner/operator has sufficient information documenting that the subject hazardous waste is similar to a hazardous waste which has been previously treated at the facility where the same treatment conditions and the same treatment chemicals or reagents were used.

(c) Trial tests (bench scale, pilot plant scale, or other appropriate tests) shall be performed for each hazardous waste which is new or significantly different from hazardous waste previously treated to determine treatment technique and operating conditions, and to evaluate the effectiveness of the treatment process and consequences of the proposed treatment.

(d) All treatment chemicals or reagents used in a treatment process shall be stored in such a manner as to minimize the potential for spills, fires, explosions, or uncontrolled discharges or releases.

(e) All uncovered reaction vessels shall be sized to provide no less than 60 centimeters (2 feet) freeboard to prevent splashing or spillage of hazardous waste during the treatment (e.g., neutralization, precipitation).

(f) A facility shall have the capacity to receive emergency transfer of reactor contents, or shall have emergency storage capacity to be used in the event of an equipment breakdown or malfunction.



(g) A facility which continuously feeds hazardous waste into the treatment process shall be equipped with an automatic waste food cutoff or a by-pass system which is activated when a malfunction in the treatment process occurs.

(h) Upon final closure, all hazardous waste and hazardous waste residuals shall be removed from the facility, and treated or disposed of as hazardous waste pursuant to the requirements of this Part.

(i) All residuals or by-products from a treatment process (e.g., sludges, spent resins) shall be analyzed to determine whether they are hazardous waste within the meaning of Subpart A, or assumed to be a hazardous waste.

NOTE.—Analyses of treatment residuals or by-products may be omitted provided the owner/operator can demonstrate that the subject residuals and/or by-products are similar to those previously produced at the facility.

§ 250.46 Special waste standards.

Owners and operators of facilities that treat, store, or dispose of any of the special waste covered in this Section shall comply with the respective requirements specified in this Section and shall not have to comply with the other requirements of this Subpart or Subparts B and C with respect to a special waste.

§ 250.46-1 Cement kiln dust waste.

The treatment, storage, and disposal of cement kiln dust waste determined to be a hazardous waste under § 250.13 of Subpart A are subject to the requirements of the following Sections of this Subpart:

- 250.43(f) (General Facility Standards—waste analysis);
- 250.43-1 (General Site Selection—for new sources only);
- 250.43-2 (Security);
- 250.43-5(a), (b)(1), (b)(2)(i), (b)(6-7), and (c) (Manifest System, Recordkeeping, and Reporting);
- 250.43-6 (Visual Inspections);
- 250.43-7(k), (l), and (m) (Closure and Post-Closure); and
- 250.43-8(a) and applicable requirements of (c) and (d) which relate to groundwater monitoring, (Groundwater and Leachate Monitoring—for groundwater monitoring only).

§ 250.46-2 Utility waste.

(a) The treatment, storage, and disposal of flue-gas desulfurization waste, bottom ash waste and fly ash waste, which is generated by a steam power plant solely from the use of fossil fuels, and which is determined to be a hazardous waste under § 250.13 of Subpart A, are subject to the requirements of the following Sections of this Subpart:

- 250.43(f)(h) (General Facility Standards—waste analysis);

- 250.43-1 (General Site Selection—for new sources only);
- 250.43-2 (Security);
- 250.43-5(a), (b)(1), (b)(2)(i), (b)(6-7), and (c) (Manifest System, Recordkeeping, and Reporting);
- 250.43-6 (Visual Inspections);
- 250.43-7(k), (l) and (m) (Closure and Post-Closure);
- 250.43-8(a) and applicable requirements of (c) and (d) which relate to groundwater monitoring, (Groundwater and Leachate Monitoring—for groundwater monitoring only)

§ 250.46-3 Phosphate rock mining, beneficiation, and processing waste.

(a) The treatment, storage, and disposal of hazardous waste listed in this paragraph (and which is listed as hazardous waste in § 250.14 of Subpart A) are subject to the requirements specified in paragraphs (b) and (c).

(1) Over burden, slimes (phosphoric clays) and tailings from phosphate rock mining;

(2) Waste gypsum from phosphoric acid production; and

(3) Slag and fluid bed prills from elemental phosphorus production.

(b) The requirements of the following Sections of this Subpart are applicable to waste listed under paragraph (a):

- 250.43(f) (General Facility Standards—waste analysis);
- 250.43-1 (General Site Selection—for new sources only);
- 250.43-2 (Security);
- 250.43-5(a), (b)(1), (b)(2)(i), (b)(6-7), and (c) (Manifest System, Recordkeeping, and Reporting);
- 250.43-6 (Visual Inspections);
- 250.43-7 (k), (l), and (m) (Closure and Post-Closure); and
- 250.43-8(a), and applicable requirements of (c) and (d) which relate to groundwater monitoring, (Groundwater and Leachate Monitoring—for groundwater monitoring only).

(c) Additionally, the following requirements are applicable to waste listed under paragraph (a):

(1) Location of waste deposits shall be recorded on reference maps which shall be maintained through the operating and post-closure periods.

(2) Land reclaimed by filling with waste listed in paragraph (a) shall be used for residential development only where provisions have been made to prevent alpha radiation exposure from Radon 222 inhalation from exceeding background levels by 0.03 Working Level Units and gamma radiation from exceeding background levels by 5 micro Roentgens/hour. The possible need for special construction methods for structures on such reclaimed land shall be identified to any future land owner(s) by recording a stipulation in the deed of the reclaimed land.

(3) Building products manufactured from waste listed in paragraph (a)

shall not be used if such products cause alpha radiation exposure from Radon 222 inhalation to exceed background levels by 0.03 Working Level Units or cause gamma radiation to exceed background levels by 5 micro Roentgens/hour. Purchasers of waste and of products manufactured from waste shall be advised of this requirement by the seller.

(4) Analysis required under § 250.43-8(c)(5) shall also include determination of Radium concentration in picocuries/gram.

(5) Analysis required under § 250.43-8(c)(6) shall also include the following:

- (i) Radium, picocuries/gram
- (ii) Phosphate, mg/liter
- (iii) Fluoride, mg/liter

§ 250.46-4 Uranium mining waste.

(a) The treatment, storage, and disposal of overburden and waste rock resulting from uranium mining (which is hazardous waste listed in § 250.14 of Subpart A) are subject to the requirements of the following Sections of this Subpart and to the additional requirements in paragraph (b):

- 250.43(f) (General Facility Standards—waste analysis);
- 250.43-1 (General Site Selection—for new sources only);
- 250.43-2 (Security);
- 250.43-5(a), (b)(1), (b)(2)(i), (b)(6-7), and (c) (Manifest System, Recordkeeping, and Reporting);
- 250.43-6 (Visual Inspections);
- 250.43-7(b), (k), (l), and (m) (Closure and Post-Closure); and
- 250.43-8(a), applicable requirements of (c) and (d) which relate to groundwater monitoring, (Groundwater and Leachate Monitoring—for groundwater monitoring only).

(b) Additionally, the following requirements are applicable to waste identified under paragraph (a):

(1) Location of waste deposits shall be recorded on reference maps which shall be maintained throughout the operating and post-closure periods.

(2) Land reclaimed by filling with waste identified in paragraph (a) shall be used for residential development only where provisions have been made to prevent alpha radiation exposure from Radon 222 inhalation from exceeding background levels by 0.03 Working Level Units, and gamma radiation from exceeding background levels by 5 micro Roentgens per hour. The possible need for special construction methods for structures on such reclaimed land shall be identified to any future land owner(s) by recording a stipulation in the deed of the reclaimed land.

(3) Building products manufactured from waste identified in paragraph (a) shall not be used if the products cause alpha radiation exposure from Radon 222 inhalation to exceed background levels by 0.03 Working Level Units or



## PROPOSED RULES

gamma radiation to exceed background levels by 5 micro Roentgens per hour. Purchasers of waste and of products manufactured from waste shall be advised of this requirement by the seller.

(4) Analysis required under § 250.43-8(c)(5) shall also include determination of Radium concentration in picocuries/gram.

(5) Analysis required under § 250.43-8(c)(6) shall also include the following:

- (i) Radium, picocuries/gram
- (ii) Thorium, picocuries/gram.
- (iii) Processing reagents, mg/gr.
- (iv) Molybdenum, mg/gr.

(6) As part of closure of subject disposal facilities, the site shall be reclaimed so as to support plant life indigenous to the surrounding area and shall be revegetated with such plant life.

NOTE.—Other plant life may be substituted if the substitute species provide an equivalent degree of stability to the soil.

§ 250.46-5 Other mining waste.

The treatment, storage, and disposal of discarded material from the extraction, beneficiation, and processing of ores and minerals, except phosphate rock and uranium ores (which are covered under §§ 250.46-3 and 250.46-4), which are determined to be hazardous waste under § 250.13 of Subpart A are

subject to the requirements of the following Sections of this Subpart:

- 250.43(f) (General Facility Standards—waste analysis);
- 250.43-1 (General Site Selection—for new sources only);
- 250.43-2 (Security);
- 250.43-5(a), (b)(1), (b)(2)(i), (b)(6-7), and (c) (Manifest System, Recordkeeping, and Reporting);
- 250.43-6 (Visual Inspections);
- 250.43-7(k), (l), and (m) (Closure and Post-Closure);
- 250.43-8(a) and applicable requirements of (c) and (d) which relate to groundwater monitoring, (Groundwater and Leachate Monitoring—for groundwater monitoring only).

§ 250.46-6 Gas and oil drilling muds and oil production brines.

The treatment, storage, and disposal of oil and gas drilling muds and oil production brines which are determined to be hazardous waste under § 250.13 of Subpart A are subject to the requirements of the following Sections of this Subpart:

- 250.43(f) (General Facility Standards—waste analysis);
- 250.43-1 (General Site Selection—for new sources only);
- 250.43-2 (Security);
- 250.43-5(a), (b)(1), (b)(2)(i), (b)(6-7), and (c) (Manifest System, Recordkeeping, and Reporting);
- 250.43-6 (Visual Inspections); and
- 250.43-7(k), (l), and (m) (Closure and Post-Closure).

Figure 1

FORM APPROVED  
OMB NO.

TSDF (TREATMENT, STORAGE OR DISPOSAL FACILITIES) REPORT-				
IDENTIFICATION				
NAME		TSDF IDENTIFICATION CODE		
ADDRESS		CLOSING DATE		
WASTE INFORMATION				
GENERATOR I.D. CODE	MANIFEST DOCUMENT NUMBER	SHIPPING DESCRIPTION	QUANTITY	UNIT OF MEASURE
COMMENTS				
CERTIFICATION				
"I have personally examined and am familiar with the information submitted in this certification, and I hereby certify under penalty of law that this information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."				
SIGNATURE			DATE	

DRAFT

EPA Form 8700-13 (4-78)

## PROPOSED RULES

[6560-01-M]

## APPENDIX I

## INCOMPATIBLE WASTE

Many wastes, when mixed with others at a hazardous waste facility, can potentially produce adverse human health and environmental effects through means such as the following: (1) heat generation, (2) violent re-

action, (3) release of toxic fumes and gases as a result of mixing, (4) release of toxic substances in case of fire or explosion, (5) fire or explosion, and (6) generation of flammable or toxic gases.

Below is a summary list of potentially incompatible waste materials or components and the adverse consequences resulting from mixing of waste in one group with waste in another group.

The mixing of a Group A waste with a Group B waste may have the potential consequence as noted.

## Group 1-A

Acetylene sludge  
Alkaline caustic liquids  
Alkaline cleaner  
Alkaline corrosive liquids  
Alkaline corrosive battery fluid  
Caustic wastewater  
Lime sludge and other corrosive alkalies  
Lime wastewater  
Lime and water  
Spent caustic

## Group 1-B

Acid sludge  
Acid and water  
Battery acid  
Chemical cleaners  
Electrolyte, acid-  
Etching acid liquid or solvent  
Liquid cleaning compounds  
Pickling liquor and other corrosive acids  
Spent acid  
Spent mixed acid  
Spent sulfuric acid

*Potential consequences:* Heat generation, violent reaction.

## Group 2-A

Asbestos waste, and other toxic wastes  
Beryllium wastes  
Unrinsed pesticide containers  
Waste pesticides

## Group 2-B

Cleaning solvents  
Data processing liquid  
Obsolete explosives  
Petroleum waste  
Refinery waste  
Retrograde explosives  
Solvents  
Waste oil and other flammable and explosive wastes

*Potential consequences:* Release of toxic substances in case of fire or explosion.

## Group 3-A

Aluminum  
Beryllium  
Calcium  
Lithium  
Magnesium  
Potassium  
Sodium  
Zinc powder and other reactive metals and metal hydrides

## Group 3-B

Any waste in Group 1-A or 1-B

*Potential consequences:* Fire or explosion; generation of flammable hydrogen gas.

## Group 4-A

Alcohols  
Water

## Group 4-B

Any concentrated waste in Groups 1-A or 1-B  
Calcium  
Lithium  
Metal hydrides  
Potassium  
Sodium  
SO<sub>2</sub>Cl<sub>2</sub>, SOCl<sub>2</sub>, PCl<sub>3</sub>, CH<sub>3</sub>SiCl<sub>3</sub>, and other water-reactive wastes

*Potential consequences:* Fire, explosion, or heat generation; generation of flammable or toxic gases.

## Group 5-A

Alcohols  
Aldehydes  
Halogenated hydrocarbons  
Nitrated hydrocarbons and other reactive organic compounds and solvents  
Unsaturated hydrocarbons

## Group 5-B

Concentrated Group 1-A or 1-B wastes  
Group 3-A wastes

*Potential consequences:* Fire, explosion or violent reaction.

## Group 6-A

Spent cyanide and sulfide solutions

## Group 6-B

Group 1-B wastes

*Potential consequences:* Generation of toxic hydrogen cyanide or hydrogen sulfide gas.

## Group 7-A

Chlorates and other strong oxidizers  
Chlorine  
Chlorites  
Chromic acid  
Hypochlorites  
Nitrates  
Nitric acid, fuming  
Perchlorates  
Permanganates  
Peroxides

## Group 7-B

Acetic acid and other organic acids  
Concentrated mineral acids  
Group 2-B wastes  
Group 3-A wastes  
Group 5-A wastes and other flammable and combustible wastes.

*Potential consequences:* Fire, explosion, or violent reaction.

Source: "Law, Regulations and Guidelines for Handling of Hazardous Waste". California Department of Health, February 1975.

APPENDIX II—EPA INTERIM PRIMARY AND PROPOSED SECONDARY DRINKING WATER STANDARDS

Parameter	Maximum Level
<b>A. Interim primary (mg/l)</b>	
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (VI)	0.05
Fluoride	1.4-2.4
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05
Endrin	0.002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	0.01
2,4,5-TP Silve	0.01
Radium	5 pCi/l
Gross Alpha	15 pCi/l
Gross Beta	4 millirem/yr
Turbidity	1/1U
Coliform Bacteria	1/100 ml
<b>B. Secondary (mg/l)</b>	
Chloride	250
Copper	1
Foaming Agents	0.5
Hydrogen Sulfide	0.05
Iron	0.3
Manganese	0.05
Sulfate	250
TDS	500
Zinc	5
Color	15 Color Units
Corrosivity	Non-corrosive
Odor	3 Threshold Odor Number
pH	6.5-8.5

APPENDIX III—PERMISSIBLE EXPOSURE LEVELS FOR AIRBORNE CONTAMINANTS (29 CFR 1910.1000)

Permissible exposure levels for specified airborne contaminants are given in Tables Z-1 and Z-2 below. Permissible exposure levels for mineral dusts are given in Table Z-3 below. These values are taken from Occupational Safety and Health Administration regulations (29 CFR 1910.1000).

TABLE Z-1

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3b</sup>
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene dichloride, see 1, 2-Dichloroethylene		
Acetylene tetrabromide	1	14
Acrolein	0.1	0.25
Acrylamide—Skin		0.3
Acrylonitrile—Skin	20	45
Aldrin—Skin		0.25
Allyl alcohol—Skin	2	5
Allyl chloride	1	3
C Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopyridine	0.5	2

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3b</sup>
Ammonia	50	35
Ammonium sulfamate (Ammate)		15
n-Amyl acetate	100	525
sec-Amyl acetate	125	650
Aniline—Skin	5	19
Anisidine (o, p-Isomers)—Skin		0.5
Antimony and compounds (as Sb)		0.5
ANTU (alpha naphthyl thiourea)		0.3
Arsenic and compounds (as As)		0.5
Arsine	0.05	0.2
Azinphos-methyl—Skin		0.2
Barium (soluble compounds)		0.5
p-Benzquinone, see Quinone		
Benzoyl peroxide		5
Benzyl chloride	1	5
Biphenyl, see Diphenyl		
Bisphenol A, see Diglycidyl ether		
Boron oxide		15
C Boron trifluoride	1	3
Bromine	0.1	0.7
Bromoform—Skin	0.5	5
Butadiene (1, 3-butadiene)	1,000	2,200
Butanethiol, see Butyl mercaptan		
2-Butanone	200	590
2-Butoxy ethanol (Butyl Cellosolve)—Skin	50	240
Butyl acetate (n-butyl acetate)	150	710
sec-Butyl acetate	200	950
tert-Butyl acetate	200	950
Butyl alcohol	100	300
sec-Butyl alcohol	150	450
tert-Butyl alcohol	100	300
C Butylamine—Skin	5	15
C tert-Butyl chromate (as CrO <sub>3</sub> )—Skin		0.1
n-Butyl glycidyl ether (BGE)	50	270
*Butyl mercaptan	10	35
p-tert-Butyltoluene	10	60
Calcium arsenate		1
Calcium oxide		5
**Camphor	2	
Carbaryl (Sevin)		5
Carbon black		3.5
Carbon dioxide	5,000	9,000
Carbon monoxide	50	55
Chlordane—Skin		0.5
Chlorinated camphene—Skin		0.5
Chlorinated diphenyl oxide		0.5
*Chlorine	1	3
Chlorine dioxide	0.1	0.3
C Chlorine trifluoride	0.1	0.4
C Chloroacetaldehyde	1	3
α-Chloroacetophenone (phenacylchloride)	0.05	0.3
Chlorobenzene (monochlorobenzene)	75	350
o-Chlorobenzylidene malonitrile (OCBM)	0.05	0.04
Chlorobromomethane	200	1,050
2-Chloro-1,3-butadiene, see Chloroprene		
Chlorodiphenyl (42 percent Chlorine)—Skin		1
Chlorodiphenyl (54 percent Chlorine)—Skin		0.5
1-Chloro,2,3-epoxypropane, see Epichlorohydrin		
2-Chloroethanol, see Ethylene chlorohydrin		
Chloroethylene, see Vinyl chloride		
C Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	20	100

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3b</sup>
Chloropicrin	0.1	0.7
Chloroprene (2-chloro-1,3-butadiene)—Skin	25	90
Chromium, sol. chromic chromous salts as Cr Metal and insol. salts		0.5
Coal tar pitch volatiles (benzene soluble fraction) anthracene, BaP, phenanthrene, acridine, chrysene, pyrene		0.2
Cobalt, metal fume and dust		0.1
Copper fume		0.1
Dusts and Mists		1
Cotton dust (raw)		1
Crag herbicide		15
Cresol (all isomers)—Skin	5	22
Crotonaldehyde	2	6
Cumene—Skin	50	245
Cyanide (as CN)—Skin		5
Cyclohexane	300	1,050
Cyclohexanol	50	200
Cyclohexanone	50	200
Cyclohexene	300	1,015
Cyclopentadiene	75	200
2, 4-D		10
DDT—Skin		1
DDVP, see Dichlorvos		
Decaborane—Skin	0.05	0.3
Demeton—Skin		0.1
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240
1,2-diaminoethane, see Ethylenediamine		
Diazomethane	0.2	0.4
Diborane	0.1	0.1
Dibutylphthalate		5
C o-Dichlorobenzene	50	300
p-Dichlorobenzene	75	450
Dichlorodifluoromethane	1,000	4,950
1,3-Dichloro-5,5-dimethyl hydantoin		0.2
1,1-Dichloroethane	100	400
1,2-Dichloroethylene	200	790
C Dichloroethyl ether—Skin	15	90
Dichloromethane, see Methylenechloride		
Dichloromonofluoromethane	1,000	4,200
C 1,1-Dichloro-1-nitroethane	10	60
1,2-Dichloropropane, see Propylenedichloride		
Dichlorotetrafluoroethane	1,000	7,000
Dichlorvos (DDVP)—Skin		1
Dieldrin—Skin		0.25
Diethylamine	25	75
Diethylamino ethanol—Skin	10	50
Diethylether, see Ethyl ether		
Difluorodibromomethane	100	860
C Diglycidyl ether (DGE)	0.5	2.8
Dihydroxybenzene, see Hydroquinone		
Dibutyl ketone	50	290
Dibutylamine—Skin	5	20
Dimethoxymethane, see Methylal		
Dimethyl acetamide—Skin	10	35
Dimethylamine	10	18
Dimethylaminobenzene, see Xylidene		
Dimethylaniline (N-dimethylaniline)—Skin	5	25
Dimethylbenzene, see Xylene		
Dimethyl 1,2-dibromo-2,2-dichloroethyl phosphoate, (Dibrom)		3
Dimethylformamide—Skin	10	30
2,6-Dimethylheptanone, see Dibutyl ketone		
1,1-Dimethylhydrazine—Skin	0.5	1
Dimethylphthalate		5
Dimethylsulfate—Skin	1	5

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3b</sup>
Dinitrobenzene (all isomers)—		
Skin		1
Dinitro-o-cresol—Skin		0.2
Dinitrotoluene—Skin		1.5
Dioxane (Diethylene dioxane)—Skin	100	360
Diphenyl	0.2	1
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI))		
Dipropylene glycol methyl ether—Skin	100	600
Di-sec, octyl phthalate (Di-2-ethylhexylphthalate)		5
Endrin—Skin		0.1
Epichlorohydrin—Skin	5	19
EPN—Skin		0.5
1,2-Epoxypropane, see Propyleneoxide		
2,3-Epoxy-1-propanol, see Glycidol		
Ethanthiol, see Ethylmercaptan		
Ethanolamine	3	6
2-Ethoxyethanol—Skin	200	740
2-Ethoxyethylacetate (Cellosolve acetate)—Skin	100	540
Ethyl acetate	400	1,400
Ethyl acrylate—Skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	10	18
Ethyl sec-amy ketone (5-methyl-3-heptanone)	25	130
Ethyl benzene	100	435
Ethyl bromide	200	890
Ethyl butyl ketone (3-Heptanone)	50	230
Ethyl chloride	1,000	2,600
Ethyl ether	400	1,200
Ethyl formate	100	300
C Ethyl mercaptan	10	25
Ethyl silicate	100	850
Ethylene chlorohydrin—Skin	5	16
Ethylendiamine	10	25
Ethylene dibromide, see 1,2-Dibromoethane		
Ethylene dichloride, see 1,2-Dichloroethane		
C Ethylene glycol dinitrate and/or Nitroglycerin—Skin	0.2	1
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethylene imine—Skin	0.5	1
Ethylene oxide	50	90
Ethylidene chloride, see 1,1-Dichloroethane		
N-Ethylmorpholine—Skin	20	94
Ferbam		15
Ferrovandium dust		1
Fluoride (as F)		2.5
Fluorine	0.1	0.2
Fluorotrchloromethane	1,000	5,600
Formic acid	5	9
Furfural—Skin	5	20
Furfuryl alcohol	50	200
Glycidol (2,3-Epoxy-1-propanol)	50	150
Glycol monoethyl ether, see 2-Ethoxyethanol		
Guthlon, see Azinphosmethyl		
Hafnium		0.5
Haptachlor—Skin		0.5
Haptane (n-haptane)	500	2,000
Hexachloroethane—Skin	1	10
Hexachloronaphthalene—Skin		0.2
Hexane (n-hexane)	500	1,800
2-Hexanone	100	410
Hexone (Methyl isobutyl ketone)	100	410
sec-Hexyl acetate	50	300
Hydrazine—Skin	1	1.3
Hydrogen bromide	3	10
C Hydrogen chloride	5	7
Hydrogen cyanide—Skin	10	11
Hydrogen peroxide (90%)	1	1.4

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3b</sup>
Hydrogen selenide	0.05	0.2
Hydroquinone		2
C Iodine	0.1	1
Iron oxide fume		10
Isoamyl acetate	100	525
Isoamyl alcohol	100	360
Isobutyl acetate	150	700
Isobutyl alcohol	100	300
Isophorone	25	140
Isopropyl acetate	250	950
Isopropyl alcohol	400	980
Isopropylamine	5	12
Isopropylether	500	2,100
Isopropyl glycidyl ether (IGE)	50	240
Ketene	0.5	0.9
Lead arsenate		0.15
Lindane—Skin		0.5
Lithium hydride		0.025
L.P.G. (liquified petroleum gas)	1,000	1,800
Magnesium oxide fume		15
Malthion—Skin		15
Maleic anhydride	0.25	1
C Manganese		5
Mesityl oxide	25	100
Methanethiol, see Methyl mercaptan		
Methoxychlor		15
2-Methoxyethanol, see Methyl cellosolve		
Methyl acetate	200	610
Methyl acetylene (propyne)	1,000	1,650
Methyl acetylene-propadiene mixture (Mapp)	1,000	1,800
Methyl acrylate—Skin	10	35
Methylal (dimethoxymethane)	1,000	3,100
Methyl alcohol (methanol)	200	260
Methylamine	10	12
Methyl amyl alcohol, see Methyl isobutyl carbinol		
Methyl (n-amy) ketone (2-Heptanone)	100	465
C Methyl bromide—Skin	20	80
Methyl butyl ketone, see 2-Hexanone		
Methyl cellosolve—Skin	25	80
Methyl cellosolve acetate—Skin	25	120
Methyl chloroform	350	1,900
Methylcyclohexane	500	2,000
Methylcyclohexanol	100	470
O-Methylcyclohexanone—Skin	100	460
Methyl ethyl ketone (MEK), see 2-Butanone		
Methyl formate	100	250
Methyl iodide—Skin	5	28
Methyl isobutyl carbinol—Skin	25	100
Methyl isobutyl ketone, see Hexone		
Methyl isocyanate—Skin	0.02	0.05
C Methyl mercaptan	10	20
Methyl methacrylate	100	410
Methyl propyl ketone, see 2-Pentanone		
C a Methyl styrene	100	480
C Methylene bisphenyl isocyanate (MDI)	0.02	0.2
Molybdenum		5
Soluble compounds		15
Insoluble compounds		15
Monomethyl aniline—Skin	2	9
C Monomethyl hydrazine—Skin	0.2	0.35
Morpholine—Skin	20	70
Naphtha (Coaltar)	100	400
Naphthalene	10	50
Nickel carbonyl	0.001	0.007
Nickel, metal and soluble cmpds, as Ni		1
Nicotine—Skin		0.5
Nitric acid	2	5
Nitric oxide	25	30
p-Nitroaniline—Skin	1	6
Nitrobenzene—Skin	1	5
p-Nitrochlorobenzene—Skin		1

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3b</sup>
Nitroethane	100	310
Nitrogen dioxide	5	0
Nitrogen trifluoride	10	20
Nitroglycerin—Skin	0.2	2
Nitromethane	100	250
1-Nitropropane	25	90
2-Nitropropane	25	90
Nitrotoluene—Skin	5	30
Nitrotrichloromethane, see Chloropicrin		
Octachloronaphthalene—Skin		0.1
*Octane	500	2,350
*Oil mist, mineral		5
Osmium tetroxide		0.002
Oxalic acid		1
Oxygen difluoride	0.05	0.1
Ozone	0.1	0.2
Paraquat—Skin		0.5
Parathion—Skin		0.11
Pentaborane	0.005	0.01
Pentachloronaphthalene—Skin		0.5
Pentachlorophenol—Skin		0.5
*Pentane	1,000	2,950
2-Pentanone	200	700
Perchloromethyl mercaptan	0.1	0.8
Perchloryl fluoride	3	13.5
Petroleum distillates (naphtha)	500	2,000
Phenol—Skin	5	19
p-Phenylene diamine—Skin		0.1
Phenyl ether (vapor)	1	7
Phenyl ether-biphenyl mixture (vapor)	1	7
Phenylethylene, see Styrene		
Phenyl glycidyl ether (PGE)	10	60
Phenylhydrazine—Skin	5	22
Phosdrin (Mevinphos)—Skin		0.1
Phosgene (carbonyl chloride)	0.1	0.4
Phosphine	0.3	0.4
Phosphoric acid		1
Phosphorus (yellow)		0.1
Phosphorus pentachloride		1
Phosphorus pentasulfide		1
Phosphorus trichloride	0.5	3
Phthalic anhydride	2	12
Picric acid—Skin		0.1
Pival (2-Pivalyl-1,3-indandione)		0.1
Platinum (Soluble Salts) as Pt		0.002
Propargyl alcohol—Skin	1	
Propane	1,000	1,800
n-Propyl acetate	200	840
Propyl alcohol	200	500
n-Propyl nitrate	25	110
Propylene dichloride	75	350
Propylene imine—Skin	2	5
Propylene oxide	100	240
Propyne, see Methylacetylene		
Pyrethrum		5
Pyridine	5	15
Quinone	0.1	0.4
RDX—Skin		1.5
Rhodium, Metal fume and dusts, as Rh		0.1
Soluble salts		0.001
Ronnel		10
Rotenone (commercial)		5
Selenium compounds (as Se)		0.2
Selenium hexafluoride	0.05	0.4
Silver, metal and soluble compounds		0.01
Sodium fluoroacetate (1080)—Skin		0.05
Sodium hydroxide		2
Stibine	0.1	0.5
*Stoddard solvent	500	2,950
Strychnine		0.15
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000
Sulfuric acid		1
Sulfur monochloride	1	6
Sulfur pentafluoride	0.025	0.25
Sulfuryl fluoride	5	20
Systox, see Demeton		
2,4,5T		10
Tantalum		5

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3</sup> <sup>b</sup>
TEDP—Skin		0.2
Tellurium		0.1
Tellurium hexafluoride	0.02	0.2
TEPP—Skin		0.05
C Terphenyls	1	9
1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloroethane—Skin	5	35
Tetrachloroethylene, see Perchloroethylene		
Tetrachloromethane, see Carbon tetrachloride		
Tetrachloronaphthalene—Skin		2
Tetraethyl lead (as Pb)—Skin		0.075
Tetrahydrofuran	200	590
Tetramethyl lead (as Pb)—Skin		0.07
Tetramethyl succinonitrile—Skin	0.5	3
Tetranitromethane	1	8
Tetryl (2,4,6-trinitrophenylmethyl nitramine)—Skin		1.5
Thallium (soluble compounds)—Skin as Tl		0.1

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3</sup> <sup>b</sup>
Thiram		5
Tin (inorganic cmpds, except oxides)		2
Tin (organic cmpds)		0.1
C Toluene-2,4-dithiocyanate	0.02	0.14
o-Toluidine—Skin	5	22
Toxaphene, see Chlorinated camphene		
Tributyl phosphate		5
1,1,1-Trichloroethane see Methyl chloroform		
1,1,2-Trichloroethane—Skin	10	45
Titanium dioxide		15
Trichloromethane, see Chloroform		
Trichloronaphthalene—Skin		5
1,2,3-Trichloropropane	50	300
1,1,2-Trichloro 1,2,2-trifluoroethane	1,000	7,600
Triethylamine	25	100
Trifluoromonobromomethane	1,000	6,100
2,4,6-Trinitrophenol, see Picric acid		
2,4,6-Trinitrophenylmethyl nitramine, see Tetryl		
Trinitrotoluene—Skin		1.5
Triorthocresyl phosphate		0.1
Triphenyl phosphate		3

TABLE Z-1—Continued

Substance	p.p.m. <sup>a</sup>	mg./M <sup>3</sup> <sup>b</sup>
Turpentine	100	560
Uranium (soluble compounds)		0.05
Uranium (insoluble compounds)		0.25
C Vanadium:		
V <sub>2</sub> O <sub>5</sub> dust		0.5
V <sub>2</sub> O <sub>5</sub> fume		0.1
Vinyl benzene, see Styrene		
Vinylcyanide, see Acrylonitrile		
Vinyl toluene	100	480
Warfarin		0.1
Xylene (xylo)	100	435
Xylidine—Skin	5	25
Yttrium		1
Zinc chloride fume		1
Zinc oxide fume		5
Zirconium compounds (as Zr)		5

<sup>a</sup>1970 Addition.  
<sup>b</sup>Parts of vapor or gas per million parts of contaminated air by volume at 25° C. and 760 mm. Hg pressure.  
<sup>c</sup>Approximate milligrams of particulate per cubic meter of air.

TABLE Z-2

Material	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift.	
			Concentration	Maximum duration
Benzene (Z37.4-1969)	10 p.p.m.	25 p.p.m.	50 p.p.m.	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970)	2 µg./M <sup>3</sup>	5 µg./M <sup>3</sup>	25 µg./M <sup>3</sup>	30 minutes.
Cadmium fume (Z37.5-1970)	0.1 mg./M <sup>3</sup>	3 mg./M <sup>3</sup>		
Cadmium dust (Z37.5-1970)	0.2 mg./M <sup>3</sup>	0.6 mg./M <sup>3</sup>		
Carbon disulfide (Z37.3-1968)	20 p.p.m.	30 p.p.m.	100 p.p.m.	Do.
Carbon tetrachloride (Z37.17-1967)	10 p.p.m.	25 p.p.m.	200 p.p.m.	5 minutes in any 4 hours.
Ethylene dibromide (Z37.31-1970)	20 p.p.m.	30 p.p.m.	50 p.p.m.	5 minutes.
Ethylene dichloride (Z37.21-1969)	50 p.p.m.	100 p.p.m.	200 p.p.m.	5 minutes in any 3 hours.
Formaldehyde (Z37.16-1967)	3 p.p.m.	5 p.p.m.	10 p.p.m.	30 minutes.
Hydrogen fluoride (Z37.28-1969)	do			
Fluoride as dust (Z37.28-1969)	2.5 mg./M <sup>3</sup>			
Lead and its inorganic compounds (Z37.11-1969)	0.2 mg./M <sup>3</sup>			
Methyl chloride (Z37.18-1969)	100 p.p.m.	200 p.p.m.	300 p.p.m.	5 minutes in any 3 hours.
Methylene Chloride (Z37.3-1969)	500 p.p.m.	1,000 p.p.m.	2,000 p.p.m.	5 minutes in any 2 hours.
Organo (alkyl) mercury (Z37.30-1969)	0.01 mg./M <sup>3</sup>	0.04 mg./M <sup>3</sup>		
Styrene (Z37.15-1969)	100 p.p.m.	200 p.p.m.	600 p.p.m.	5 minutes in any 3 hours.
Trichloroethylene (Z37.19-1967)	do	do	300 p.p.m.	5 minutes in any 2 hours.
Tetrachloroethylene (Z37.22-1967)	do	do	do	5 minutes in any 3 hours.
Toluene (Z37.12-1967)	200 p.p.m.	300 p.p.m.	500 p.p.m.	10 minutes.
Hydrogen sulfide (Z37.2-1966)	do	20 p.p.m.	50 p.p.m.	10 minutes once only if no other measurable exposure occurs.
Mercury (Z37.8-1971)		1 mg./10M <sup>3</sup>		
Chromic acid and chromates (Z37-1971)		do <sup>c</sup>		

TABLE Z-3—MINERAL DUSTS

Substance	Mppcf <sup>a</sup>	Mg/M <sup>3</sup>
Silica:		
Crystalline:		
Quartz (respirable)	250 <sup>b</sup>	10mg/M <sup>3</sup> <sup>b</sup>
Quartz (total dust)	%SiO <sub>2</sub> +5 <sup>c</sup>	%SiO <sub>2</sub> +2 30mg/M <sup>3</sup>
Amorphous, including natural diatomaceous earth	20	80mg/M <sup>3</sup> %SiO <sub>2</sub>
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz.		
Tridymite: Use ½ the value calculated from the formulae for quartz.		

TABLE Z-3—MINERAL DUSTS

Substance	Mppcf <sup>a</sup>	Mg/M <sup>3</sup>
Silicates (less than 1% crystalline silica):		
Mica	20	
Soapstone	20	
Talc (non-asbestos-form)	20 <sup>b</sup>	
Talc (fibrous). Use asbestos limit		
Tremolite (see talc, fibrous)		
Portland cement	50	
Graphite (natural)	15	
Coal dust (respirable fraction less than 5% SiO <sub>2</sub> )		2.4mg/M <sup>3</sup>
For more than 5% SiO <sub>2</sub>		10mg/M <sup>3</sup>
or		5SiO <sub>2</sub> +2
Inert or Nuisance Dust:		
Respirable fraction	15	5mg/M <sup>3</sup>
Total dust	50	15mg/M <sup>3</sup>

TABLE Z-3—MINERAL DUSTS

Note: Conversion factors—mppcf×35.3=million particles per cubic meter=particles per c.c.  
<sup>a</sup>Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.  
<sup>b</sup>The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.  
<sup>c</sup>As determined by the membrane filter method at 430×phase contrast magnification.  
<sup>d</sup>Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:  
<sup>e</sup>Containing 1% quartz; if >1% quartz, use quartz limit.



## APPENDIX IV—METHODS FOR DETERMINING SOIL pH

## A. Method For Soil pH in Water (For Non-Calcareous Soils)

To 20 g. of soil in a 50-ml. beaker, add 20 ml. of distilled water, and stir the suspension several times during the next 30 minutes. Let the soil suspension stand for about 1 hour to allow most of the suspended clay to settle out from the suspension. Adjust the position of the electrodes in the clamps of the electrode holder so that, upon lowering the electrodes into the beaker, the glass electrode will be immersed well into the partly settled suspension, and the calomel electrode will be immersed just deep enough into the clear supernatant solution to establish a good electrical contact through the ground-glass joint or the fiber-capillary hole. Then insert the electrodes into the partly settled suspension as indicated above, measure the pH, and report the results as "soil pH measured in water."

B. Method For Soil pH in 0.01M CaCl<sub>2</sub> Solution (For Calcareous Soils)

## Reagents

1. Stock calcium chloride solution (CaCl<sub>2</sub>) 3.6M: Dissolve 1,059 g. of CaCl<sub>2</sub>·2H<sub>2</sub>O in distilled water in a 2-liter volumetric flask. Cool the solution, dilute it to volume with distilled water, and mix it well. Dilute 20 ml. of this solution to 1 liter with distilled water in a volumetric flask, and standardize it by titrating a 25 ml. aliquot of the diluted solution with standard 0.1N AgNO<sub>3</sub>, using 1 ml. of 5% K<sub>2</sub>CrO<sub>4</sub> as the indicator.

2. Calcium chloride (CaCl<sub>2</sub>) 0.01M: Dilute 50 ml. of stock 3.6M CaCl<sub>2</sub> to 18 liters with distilled water. If the pH of this solution is not between 5 and 6.5, adjust the pH by addition of a little Ca(OH)<sub>2</sub> or HCl. As a check on the preparation of this solution, measure its electrical conductivity. The specific conductivity should be 2.32 ± 0.08 mmho. per cm. at 25°C.

## Procedure

To 10 g. of soil in a 50 ml. beaker, add 20 ml. of 0.01M CaCl<sub>2</sub> solution, and stir the suspension several times during the next 30 minutes. Let the soil suspension stand for about 30 minutes to allow most of the suspended clay to settle out from the suspension. Adjust the position of the electrodes in the clamps of the electrode holder so that, upon lowering the electrodes into the beaker, the glass electrode will be immersed well into the partly settled suspension and the calomel electrode will be immersed just deep enough into the clear supernatant solution to establish a good electrical contact through the groundglass joint or the fiber-capillary hole. Then insert the electrodes into the partly settled suspension as indicated above, measure the pH, and report the results as "soil pH measured in 0.01M CaCl<sub>2</sub>."

SOURCE: "Methods of Soil Analysis". Part II, Chemical and Microbiological Properties. C. A. Black, Ed. (American Society of Agronomy), 1965.

## Subpart E—Permits for Treatment, Storage, or Disposal of Hazardous Waste

AUTHORITY: Sec. 3005 Pub. L. 94-580, 90 Stat. 2808 (42 USC 6925).

## § 250.50 Reference.

Regulations developed pursuant to Section 3005 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (42 USC 6925), concerning permits for treatment, storage, and disposal of hazardous waste are being integrated with similar permit regulations under the Clean Water Act and the Safe Drinking Water Act, and will be proposed under Title 40, CFR, Parts 122, 124, and 128.

## Subpart F—Guidelines for Authorized State Hazardous Waste Programs

AUTHORITY: Sec. 3006, Pub. L. 94-580, 90 Stat. 2809 (42 USC 6926).

## § 250.60 Reference.

Guidelines developed pursuant to Section 3006 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (42 USC 6926), concerning authorized State hazardous waste programs are being integrated with similar State authorization regulations under the Clean Water Act and the Safe Drinking Water Act, and will be proposed under Title 40, CFR, Parts 122 and 123.

[FR Doc. 78-34903 Filed 12-15-78; 8:45 am]

## [6560.01-M]

[40 CFR Part 250]

[FRL 1014-7]

## IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

## Advance Notice of Proposed Rulemaking

AGENCY: Environmental Protection Agency.

ACTION: Advance Notice of Proposed Rulemaking.

SUMMARY: This Notice solicits data, information, case studies, and operating experience relevant to the expansion of the characteristics for identifying hazardous waste pursuant to Section 3001 of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976. This Notice should be reviewed in the context of the Proposed Rulemaking for Section 3001 (Subpart A, 40 CFR Part 250) appearing in this same issue of the FEDERAL REGISTER.

DATES: Comments received on or before July 1, 1979 will be of primary importance in further development of these regulations. All comments will be available for public inspection by

contacting the Docket Section at the address below.

ADDRESSEES: Comments to: John P. Lehman, Director, Hazardous Waste Management Division, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. Attn: Section 3001 ANPR. Official record for this rulemaking is available at: Docket Section, Rm 2111D, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460, and available for viewing from 9 a.m. to 4 p.m., Monday through Friday, excluding holidays.

## FOR FURTHER INFORMATION CONTACT:

Mr. Alan S. Corson (202) 755-9187.

## SUPPLEMENTAL INFORMATION:

This Notice begins a second phase of data gathering and information development that commenced with an Advance Notice of Proposed Rulemaking (ANPR) (May 2, 1977, 42 FR 22332-22334). The culmination of this first ANPR was a set of rulemaking proposals pursuant to Sections 3001, 3002, and 3004 of the Act (appearing in today's issue of the FEDERAL REGISTER) and proposals pursuant to Section 3006 (February 1, 1978, 43 FR 4942-4955), and Section 3003 (April 28, 1978, 43 FR 18506-18512).

This ANPR focuses on the need to expand the data and information available to the Agency to further develop EPA's actions under Section 3001, beyond the proposal which appears in today's FEDERAL REGISTER (40 CFR Part 250; Subpart A). Specifically, this ANPR solicits data, information, case studies, and operating experience which could lead to the addition of further characteristics for identification of hazardous waste. The attributes of waste under consideration for designation as additional characteristics include radioactivity, genetic activity, bioaccumulation, and additional aspects of toxicity which would include toxicity to aquatic organisms, toxicity to terrestrial plants, and toxicity to humans resulting from chronic exposure to organic chemicals.

The implications of the Agency designating characteristics in addition to those cited in the proposed rulemaking elsewhere in today's FEDERAL REGISTER are potentially significant. Any person responding to this ANPR should review and evaluate the preamble to the above-mentioned proposed rule to fully appreciate these implications.

The additional characteristics and tests are described in paragraphs (a) and (b). Comments are specifically invited on the following questions.

1. Should the Agency add additional characteristics to those proposed in today's FEDERAL REGISTER? Are the at-

tributes which are candidates (items (a) and (b)) necessary and sufficient for this purpose?

2. How well do the suggested properties measure the characteristic in question? What alternative properties would be more effective and why?

3. How well do the suggested tests measure the property in question both qualitatively and quantitatively? and

4. What are the economic implications of using tests as determinants of whether or not a given waste is hazardous, including costs of testing and availability of testing facilities and personnel?

Dated: December 11, 1978.

DOUGLAS M. COSTLE,  
Administrator.

(a) *Radioactivity.* A solid waste is a hazardous waste if it is not source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, as amended, and if a representative sample of the waste has either of the following properties:

(1) The average radium-226 concentration exceeds 5 picocuries per gram for solid wastes or 50 picocuries (radium-226 and radium-228 combined) per liter for liquid wastes; as determined by either of the methods cited in Appendix I; or

(2) The total radium-226 activity equals or exceeds 10 microcuries for any single discrete source.

(b) *Toxicity.* A solid waste is a hazardous waste if the extract obtained from applying the Extraction Procedure (see Section 250.13(d)(2) in Subpart A, 40 CFR Part 250) to a representative sample of the waste has any of the following properties, according to the tests specified in Appendices II-VI.

(1) Either contains more than one mg/liter of any compound on the Controlled Substances List in Appendix II or gives a positive response in any one of the tests for mutagenic activity, described in Appendix III.

A total of three assays would be conducted, one chosen from Group I, one from Group II, and one from those listed in Group III.

GROUP I—DETECTION OF GENE MUTATIONS

A. Point mutation in bacteria.

GROUP II—DETECTION OF GENE MUTATIONS

A. Mammalian somatic cells in culture.  
B. Fungal microorganisms.

GROUP III—DETECTING EFFECTS ON DNA REPAIR OR RECOMBINATION AS AN INDICATION OF GENETIC DAMAGE

A. DNA repair in bacteria (including differential killing of repair-defective strains).  
B. Unscheduled DNA synthesis in human diploid cells.  
C. Sister-chromatid exchange in mammalian cells.

D. Mitotic recombination and/or gene conversion in yeast.

A result shall be considered positive for the mutagenic activity assays if a reproducible increase is observed in the effect being measured over negative control.

(2) Gives a positive result in the Bioaccumulation Potential Test defined in Appendix IV.

(3) Exceeds any of the applicable thresholds when evaluated according to paragraph (a) or (b) of this section.

(a) Analytic threshold.

A. Has a concentration of a substance for which an EPA National Interim Primary Drinking Water Standard has been established, which is greater than or equal to 10 times that standard.

B. Contains any organic substance which has a calculated human LD50 of less than 800 mg/kg, at a concentration in mg/l greater than or equal to 0.35 times its LD50 expressed in units of mg/kg. For the purposes of these regulations, metallic salts of organic acids containing 3 or fewer carbon atoms are considered not to be organic substances.

PROCEDURE FOR CALCULATING HUMAN LD50 VALUE

The LD50 value to be used will be that for oral exposure to rats. Where a value for the rat is not available, mouse oral LD50 data may be employed. Where an appropriate LD50 value for the rat or mouse is listed in the NIOSH *Registry of Toxic Effects of Chemical Substances* ("Registry"), this value may be used without validation. If other values are used, they must be supported by specific and verified laboratory reports. The appropriate conversion factors to use in calculating LD50's are

Rat x .16 = human  
Mouse x .066 = human

Example: Tetraethylenepentamine

Listed oral rat LD50 is 3990 mg/kg, calculated human LD50 is  $3990 \times 0.16 = 638$  mg/kg;  $638 \times 0.35 = 223$  mg/l.

Thus, if the EP extract contains more than 223 mg/l of tetraethylenepentamine the waste is hazardous.

(b) Bioassay threshold.

A. Interferes with reproduction and/or growth as determined by the daphnia magna assay in Appendix V.

B. Interferes with plant growth in any one of the terrestrial plant assays in Appendix VI. All of the assays specified would be required.

APPENDIX I—RADIOACTIVE WASTE MEASUREMENTS

Radium-226 concentration can be determined by either of the following methods referenced in Part 300 of *Standard Methods for the Examination of Water and*

*Wastewater*, 13th ed. APHA, AWWA-WPCF, New York (1970).

1. Precipitation method

2. Radon Emanation Technique Radium-226 concentration in liquid sources can be determined by the method referenced in *Interim Radiochemical Methodology for Drinking Water* (EPA-600/4-75-008 (Revised)). Additional Information Concerning Sample Preparation

1. *Radioassay Procedures for Environmental Samples* U.S. Department of Health, Education & Welfare, Public Health Service, Rockville, MD. (1967)

2. *Method for Determination of Radium-226 in Solid Waste Samples* available from USEPA Office of Solid Waste.

APPENDIX II—CONTROLLED SUBSTANCE LIST

NOTE.—Compounds and classes which have been reported to be either mutagenic, carcinogenic, or teratogenic and which would not give a positive indication of activity using the prescribed tests. Where a class of compounds is listed, inclusion on this list does not mean that all members of the class have been shown to be either mutagenic, carcinogenic, or teratogenic. Demonstration that specific class members contained in the waste have not been shown to be either mutagenic, carcinogenic, or teratogenic, will be sufficient for a demonstration of non-hazard by reason of mutagenic activity (MD).

- Aloperidin
- Amantadine
- 4-Aminoantipyrin acetamide
- Aminopterin
- 3-Amino-1,2,4-triazole
- 6-Azauridine
- Azo dyes
- Benzene
- Bisulfan
- Carbon tetrachloride
- Chloroquine
- Chlorambucil
- Cobalt salts
- Colchicine
- Coumarin Derivatives
- Cycasin
- Cyclophosphamide
- Dextroamphetamine sulfate
- Diazepam (Valium)
- Diethylstilbestrol
- Dimethylaminoazobenzene
- Dimethylnitrosamine
- Diphenylhydantoin
- Ethionine
- Griseofulvin
- 1-Hydroxysafrole
- Maleic Hydrazide
- Methotrexate
- Methylthiouracil
- Mytomycin-C
- d-Penicillamine
- Phenylalanine
- Phorbol esters
- Quinine
- Risperine
- p-Rosanilin
- Safrole
- Serotonin
- Streptomycin
- Testosterone
- Thioacetamide thiourea
- Trimethadione
- d-Tubocurarine

APPENDIX III—MUTAGENIC ACTIVITY DETECTION

GROUP I—DETECTION OF GENE MUTATIONS

a. Point Mutations in Bacteria.

1. *Positive Controls.* All assays must be run with a concurrent positive control. Positive control compounds or mixtures shall be selected to demonstrate both the sensitivity of the indicator organism and the functioning of the metabolic activation system.

2. *Negative controls.* A solvent negative control shall be included.

3. *Choice of Organisms.* The bacteria used shall include strains capable of detecting base pair substitutions (both transitions and transversions) and frame-shift mutations. The known spectrum of chemical mutagens capable of being detected by the strains shall be considered when selecting the strains. The strains shall also be highly sensitive to a wide range of chemical mutagens. They may include strains whose cell wall, DNA repair, or other capabilities have been altered to increase sensitivity (Ames, 1975; McCann *et al.*, 1975). Although sensitive bacterial assays for forward mutations at specific loci or over some portion of the entire genome may also be appropriate, at the present time the most sensitive and best-characterized bacteria for mutagenicity testing are those capable of indicating reverse mutations at specific loci.

4. *Methodology.*—(i) *General.* The test shall be performed in all respects in a manner known to give positive results for a wide range of chemical mutagens at low concentrations. Tests must be run with and without metabolic activation. The sensitivity and reproducibility of the metabolic activation systems and strains used shall be evaluated both by reference to past work with the method and by the concurrent use of positive controls.

(ii) *Plate assays.* In general, the EP extract should be tested by plate incorporation assays at various concentrations. Test conditions should minimize the possible effects due to extraneous nutrients, contamination by other bacteria, and high levels of spontaneous mutants.

(iii) *Liquid suspension assays.* A few chemicals (e.g., diethylnitrosamine and dimethylnitrosamine) will give positive results only in tests in which the test substance, the bacteria, and the metabolic activation system are incubated together in liquid prior to plating, but not in a plate incorporation assay (Bartsch *et al.*, 1976). Thus, tests shall be conducted in liquid suspension as well as on agar plates.

(iv) *Doses.* The highest test dose which does not result in excessive cell death shall be used.

#### GROUP II—DETECTION OF GENE MUTATIONS

##### a. *Mammalian Somatic Cells in Culture.*

1. *Choice of cell systems.* A number of tests in mammalian somatic cells in culture are available in which specific locus effects may be detected in response to chemical exposure (Shapiro *et al.*, 1972; Chu, 1971). The cell line used shall have demonstrated sensitivity of chemical induction of specific-locus mutations by a variety of chemicals. The line shall be chosen for ease of cultivation, freedom from biological contaminants such as mycoplasmas, high and reproducible cloning efficiencies, definition of genetic detection, loci, and relative karyotypic stability. The inherent capabilities of the test cells for metabolic activation of promutagens to active mutagens shall also be considered, as well as the use of metabolic activation systems similar to those used with microorganisms.

2. *Methodology.*—(i) *General.* The test shall be performed in all respects in a manner known to give positive results for a wide range of chemical mutagens. The sensitivity of the system, metabolic activation capability, and its reproducibility must be evaluated by reference to past work and by the concurrent use of positive controls. Culture conditions which may affect the detection of mutations and give falsely high or low figures for reasons other than chemical induction shall be avoided. Definition of detected genetic loci studies and verification that the observed phenotypic changes are indeed genetic alterations should be presented.

##### b. *Mutation in Fungi.*

1. *Controls.* All considerations discussed under Group I, a, are applicable.

2. *Choice of Organisms.* The fungi used shall include strains capable of detecting base pair substitutions (both transitions and transversions) and frame-shift mutations. More inclusive assay systems, such as those designed to detect recessive lethals, are also acceptable. The known spectrum of chemical mutagens capable of being detected by the strains shall be considered when selecting the strains. The strains shall also be highly sensitive to a wide range of chemical mutagens. Strains altered in DNA repair or other capabilities with the intent to increase sensitivity may be used, subsequent to validation. Either forward or reverse mutation assays may be applied.

3. *Methodology.*—(i) *General.* All considerations discussed under Group I, a, 4, (i) are applicable. *Care should be taken to investigate stage sensitivity, i.e., replicating versus non-replicating cells as well as possible requirement for post-treatment growth.*

(ii) *Plate Assays.* While spot tests and plate incorporation assays are useful for preliminary testing, they shall not be considered conclusive.

#### GROUP III—DETECTING EFFECTS ON DNA REPAIR OR RECOMBINATION AS AN INDICATION OF GENETIC DAMAGE

##### a. *DNA Repair in Bacteria.*

1. *Controls.* All considerations discussed under Group I are applicable.

2. *General.* (i) When the DNA of a cell is damaged by a chemical mutagen, the cell will utilize its DNA repair enzymes in an attempt to correct the damage. Cells which have reduced capability of repairing DNA may be more susceptible to the action of chemical mutagens, as detected by increased cell death rates. For suspension tests using DNA repair-deficient bacteria, the positive control should be similar in toxicity to the test mixture.

(ii) The DNA repair test in bacteria determines if the test substance is more toxic to DNA repair-deficient cells than it is to DNA repair-competent cells. Such differential toxicity is taken as an indication that the chemical interacts with the DNA of the exposed cells to produce increased levels of genetic damage.

3. *Choice of Organisms.* Two bacterial strains, with no known genetic differences other than DNA repair capability, shall be used. The strains selected shall be known to be capable of indicating the activity of a wide range of chemical mutagens. The spectrum of chemical mutagens and chemical mixtures capable of being detected by the strains and procedures used shall be reported.

4. *Methodology.*—(i) *Plate test.* The EP extract should be tested by spotting a quantity on an agar plate which has had a lawn of the indicator organisms spread over it. After a suitable incubation period, the zone of inhibition around the spot shall be measured for each strain and compared for the DNA repair-competent and DNA repair-deficient strains. If no discrete zone of inhibition is seen with either strain, then the results of the tests are not meaningful.

(ii) *Liquid suspension test.* The liquid suspension test shall also be performed by comparing the rates at which given concentrations of the test substances will kill each of the two indicator strains when incubated in liquid suspension. Conditions should be adjusted so that significant killing of the DNA repair-competent strain occurs, if this is possible. Methodology is discussed in Kelly *et al.* (1976).

(iii) *Doses.* The dose level of test substances used in the plate or suspension test shall be adjusted so that significant toxicity to the DNA repair-competent strain is measured. In the plate test, this means that a zone of inhibition must be visible; in the suspension test, significant loss of cell viability must be measured. This may not be possible if the test substance is not toxic to the bacteria or if, in the plate test, it does not dissolve in and diffuse through the agar. The same dose must be used in exposing the DNA repair-competent and repair-deficient strains.

##### b. *Unscheduled DNA Synthesis in Human Diploid Cells.*

1. *General.* DNA damage induced by chemical treatment of a cell can be measured as an increase in unscheduled DNA synthesis which is an indication of increased DNA repair. Unrepaired or mis-repaired alterations may result in gene mutations or in breaks or exchanges which can lead to deletion and/or duplication of larger gene sequences or to translocations which may affect gene function by position effects (Stich, 1970; Stoltz *et al.*, 1974).

2. *Methodology.*—(i) *General.* Primary or established cell cultures with normal repair function shall be used. Standardized human cell strains from repositories are recommended. Controls should be performed to detect changes in scheduled DNA synthesis at appropriate sections in the experimental design. The media conditions shall be optimal for measuring repair synthesis.

(ii) *Dose.* At least five dose levels shall be used and the time in the cycle of synchronous or non-proliferating cells at which exposure takes place shall be given. The maximum compound dose shall induce toxicity, and the dosing period with the test substance shall not be less than sixty minutes.

##### c. *Sister Chromatid Exchange in Mammalian Cells with and without Metabolic Activation.*

1. *Controls.* All considerations discussed under Group I, a, are applicable.

2. *General.* Cytological techniques are available to evaluate the genetic damage induced by chemicals. In the past few years a technique has been developed for identifying sister chromatid exchanges much more simply and efficiently than by the autoradiographic method. The method utilizes the fact that a fluorescent stain Hoechst 33258 binds to thymidine-containing DNA but not, or far less efficiently, to BrdUrd-substituted DNA. This means that the order of fluorescence would be brightest for DNA unreplacated in BrdUrd, intermediate for DNA

after one round of replication in BrdUrd, and least for DNA following two rounds of replication in BrdUrd. Thus a sister chromatid exchange can be seen as a switch of fluorescence pattern at the point of exchange. Perry and Wolff (Nature 251, 156-158 (1974)) combined Hoechst staining with Giemsa staining such that the brightly fluorescing regions stain darkly with Giemsa, and the dullly fluorescent regions hardly stain at all.

3. *Choice of Organisms.* Chromosomal preparations of human peripheral blood leukocytes or Chinese hamster ovary cells shall be used.

4. *Methodology—(i) General.* The test method must be capable of detecting sister chromatid exchanges. Procedures reported by Perry and Wolff (Nature 251, 156-158 (1974)) and Moorhead, *et al.* (Exp. Cell Res. 20, 613-616 (1960)) are recommended. Metabolic activation with rat liver S-9 mix should be incorporated whenever it is appropriate.

(ii) *Doses.* Test substances shall be tested to the highest dose where toxicity does not interfere with the test procedure.

d. *Mitotic Recombination and/or Gene Conversion in Yeast.*

1. *Controls.* All considerations discussed under Group I are applicable.

2. *General.* One can effectively study the chromosomes of eukaryotic microorganisms by employing classical genetic methodologies which depend upon the behavior and interaction of specific markers spaced judiciously within the genome. These methods have been developed over several decades and have been applied in recent years to the study of induced genetic damage (Zimmerman, 1971, 1973, 1975; Brusick and Andrews, 1974).

3. *Choice of Organisms.* Diploid strains of yeasts that detect mitotic crossing-over and/or mitotic gene conversion shall be used. Additionally, as appropriate strains are developed, monitoring for induced non-disjunction and other effects may be possible. Mitotic crossing-over shall be detected in a strain of organism in which it is possible, by genetic means, to determine with reasonable certainty that reciprocal exchange of genetic information has occurred.

Strains employed for genetic testing shall be of proven sensitivity to a wide range of mutagens.

4. *Methodology—(i) General.* In general, wastes shall be tested in liquid suspension tests.

#### REFERENCES

Ames, B. N. 1976. The Salmonella/microsome mutagenicity test. In *Origins of Human Cancer*. J. D. Watson and H. Blatt, eds. New York: Cold Spring Harbor Laboratory Press.

Ames, B. N., J. McCann, and E. Yamasaki. 1975. Methods for detecting carcinogens and mutagens with the *Salmonella*/mammalian microsome mutagenicity test. *Mut. Res.* 31:347-364.

Bartsch, H., A. Camus, and C. Malaveille. 1976. Comparative incubation system in presence of rat or human tissue fractions. *Mutat. Res.* 37 (2-3): 149-162.

Brusick, D. and H. Andrews. 1974. Comparison of the genetic activity of dimethylnitrosamine, ethyl methane sulfonate, 2-acetylaminofluorene, and ICR-170 in *Saccharomyces cerevisiae* strains D3, D4, and D5 using *in vitro* assays, with and without metabolic activation. *Mut. Res.* 26:491-500.

Chu, E. H. Y. 1971. Induction and analysis of gene mutations in mammalian cells in culture. In *Chemical Mutagens: Principles and Methods for Their Detection*. A. Hollaender, ed. Vol. 2: 411-444. New York: Plenum Press.

Clive, D., and J. F. S. Spector. 1975. Laboratory procedures for assessing specific locus mutations at the TK locus in cultured L5178Y mouse lymphoma cells. *Mut. Res.* 31: 17-29.

Kelley, R. B., M. R. Atkinson, J. A. Huberman, and A. Kornberg. 1969. Exclusion of thymine dimers and other mismatches by sequences by DNA polymerase of *Escherichia coli*. *Nature* 224: 495-501.

Kelly, W. S. and N. D. Grindley. 1976. POLA6, a mutation affecting DNA binding capacity of DNA-polymerase I. *Nucl. Acid R.* 3 (11): 2971-2984.

McCann, J. N., E. Springarn, J. Bobori and B. N. Ames. 1975. Detection of carcinogens as mutagens: bacterial tester strains with R. factor plasmids. *Proc. Natl. Acad. Sci. USA.* 72: 979-983.

Moorhead, P. S., P. C. Nowell, W. J. Mellman, D. M. Battips, and D. A. Hungerford. 1960. Chromosomal preparations of leukocytes cultured from human peripheral blood. *EXP. Cell Res.* 20: 613-616.

Perry, P., and S. Wolff. 1974. New Giemsa method for differential staining of sister chromatids. *Nature* 251 (5471) 156-158.

Sato, K., R. S. Slesinski and J. W. Littlefield. 1972. Chemical mutagenesis at the phosphoribosyltransferase locus in cultured human lymphoblasts. *Proc. Nat. Aca. Sci. USA.* 69: 1244-1248.

Shapiro, N. I., A. E. Khalizev, E. V. Luss, M. I. Marshak, O. N. Petrova, and N. B. Varshaver. 1972. Mutagenesis in cultured mammalian cells. I. Spontaneous gene mutations in human and Chinese hamster cells. *Mut. Res.* 15: 203-214.

Stitch, H. R. R. H. C. San, and Y. Kawazoe. 1971. DNA repair synthesis in mammalian cells exposed to a series of oncogenic and nononcogenic derivatives of 4-nitroquinoline-1-oxide. *Nature* 229: 416-419.

Stoltz, D. R., L. A. Poirier, C. C. Irving, H. F. Stich, J. H. Welsburger, and H. C. Grice. 1974. Evaluation of short-term tests for carcinogenicity. *Tox. Appl. Pharm.* 29: 157-180.

Zimmerman, F. K. 1971. Induction of mitotic gene conversion by mutagens. *Mut. Res.* 11: 327-337.

Zimmerman. 1973. Yeast strain for visual screening for 2 reciprocal products of mitotic crossing over. *Mutat. Res.* 21(5): 263-269.

Zimmerman. 1975. Procedures used in the induction of mitotic recombination and mutation in the yeast, *Saccharomyces cerevisiae*. *Mut. Res.* 31:71-86.

#### APPENDIX IV—BIOACCUMULATION POTENTIAL TEST

##### (A) GENERAL

Reverse-phase liquid chromatography is a separation process in which chemicals are injected onto a column of fine particles coated with a nonpolar (water insoluble) oil and then eluted along the column with a polar solvent such as water or methanol. Recent developments in this field have produced a permanently bonded reverse-phase column in which long-chain hydrocarbon groups are chemically bonded to the column packing material which leads to a more reproducible separation. The chemicals injected are moved along the column by partitioning between the mobile water phase and the

stationary hydrocarbon phase. Mixtures of chemicals can be eluted in order of their hydrophobicity, with water soluble chemicals eluted first and the oil soluble chemicals last in proportion to their hydrocarbon/water partition coefficient. Calibration of the instrument using compounds of known octanol/water partition coefficient allows this procedure to be used to determine whether an unknown mixture contains compounds with octanol/water partition coefficients above a designated level.

Specific correlations exist between octanol/water partition coefficients and bioconcentration in fish. This test thus offers a rapid, inexpensive method of identifying those mixtures which contain compounds which pose a potential bio-accumulative hazard.

Compounds with log P 3.5, but which readily biodegrade would not be expected to persist in the environment long enough for accumulation to occur. Thus a degradation option has been included in order to exempt these substances from the hazardous waste control system.

##### (B) CHROMATOGRAPHY CONDITIONS

A liquid chromatograph equipped with a high pressure stopflow injector and a 254 nm ultraviolet detector with an 8 ul cell volume and 1 cm path length is employed. The column is a Varian Preparative Micropak C-H (Catalog number 07-000181-00), or its equivalent, consisting of a 250 mm X 8 mm (i.d.) stainless steel cylinder filled with 10 micron Lichrosorb to which octadecylsilane is permanently bonded.

The column is operated at ambient temperature. The solvent consists of a mixture of water and methanol (15:85, v/v) which is pumped through the column at 2.0 ml/minute.

##### (C) RETENTION VOLUME CALIBRATION

Chemicals are dissolved in a mixture of acetone and cyclohexane (3:1, v/v). For preparing the calibration curve the quantity of individual chemicals in the solution is adjusted to give a chromatographic peak of at least 25 percent of the recorder scale. Acetone produces a large peak at approximately 2.6 minutes.

Six chemicals for which Log P has been reported are used to calibrate the elution time in units of Log P. The calibration mixture is summarized in Table 1 and includes benzene, bromobenzene, biphenyl, bibenzyl, p,p'-DDE, and 2,4,5,2',5'-pentachlorobiphenyl.

##### (D) SENSITIVITY CALIBRATION

The mixture is chromatographed and a calibration curve prepared daily to eliminate small differences due to flow rate or temperature and to follow the retention properties of the column during prolonged use. The calibration is made by plotting Log P vs the logarithm of the absolute retention time (log RT). Figure 1 is an example of such a calibration curve.

##### (E) TEST PROCEDURE

(1) Prepare a calibration curve as described above.

(2) Calculate the geometric mean of the instrumental response to the chemicals listed in Table 1 with the exception of the acetone. This value, expressed in ug/25% full scale deflection, is designated the Instrumental Sensitivity (IS).

## PROPOSED RULES

(3) Extract X liters of the Extraction Procedure extract to be tested, using dichloromethane, and concentrate the extract to a quantity suitable for injection onto the column. The quantity X is determined by the instrumental sensitivity and is given by the relationship: X in liters = IS in micrograms.

(4) Analyze the extract using the now calibrated chromatograph. A positive response is defined as an instrumental response greater than or equal to 25 percent full scale detector response in the region of Log P greater than or equal to 3.5.

(5) If a positive response is indicated in step (4), then subject a sample of the waste to a biodegradation assay and then retest. If a positive response with the degraded waste is not obtained, then the waste is not considered to be hazardous by reason of bioaccumulativity.

TABLE I—Partition Coefficients for Chemicals Used for Calibration

	Log P
Acetone.....	0.55
Benzene.....	2.13
Bromobenzene.....	2.99
Biphenyl.....	3.76
Bibenzyl.....	4.81
p,p'-DDE.....	5.69
2,4,5,2',5'-Pentachlorobiphenyl.....	6.11

APPENDIX V—DAPHNIA MAGNA REPRODUCTION ASSAY

(A) METHOD

(1) Tests are run at only one dilution of the neutralized extract.

(2) First instar *D. magna*, 12 hours  $\pm$  12 hours old are utilized.

(3) One *D. magna* is placed in 50 ml of extract solution in a 100 ml glass beaker with a watch glass.

(4) Temperature is maintained at 20.0  $\pm$  0.5°C in an environmental chamber under 12-hour light/dark lighting regime.

(5) Dilution water is either filtered spring or well water (pH 7.8; alkalinity, 119 mg/l; hardness, 140 mg/l).

(6) All tests are run with ten replicates, and a set of ten controls. Test organisms are transferred to freshly prepared test solution in clear beakers and fed two ml of prepared

food every Monday, Wednesday, and Friday, and the number of young in each beaker are counted.

(7) Test duration is 28 days or until all animals have died, whichever comes first.

(B) HANDLING

(1) Organisms should be handled as little as possible.

(2) Smooth glass tubes with rubber bulbs should be used for transferring daphnids.

(3) Food should be added to freshly prepared test solution in 100 ml beakers before animals are transferred.

(C) FOOD

(1) Food mixture of 1 mg/ml per animal used.

(2) 1 mg/ml preparation:

(i) Enough Ralston Purina Micro-Mixed Trout Chow is ground and then mixed at high speed with distilled water in a blender to produce 10 mg/ml concentration.

(ii) The mixture is then screened to remove unground particles, and refrigerated.

(iii) The mixture is diluted with distilled water to 1 mg/ml when needed.

(D) RESULTS

Comment is specifically requested concerning what biological measures to use in defining a significant change in growth or reproduction. Currently under study are the following indicators:

1. Average survival time during test period (days).

2. Average age at first brood release (days).

3. Average number of broods of young per adult.

4. Average number of young produced per adult.

5. Average number of young per brood.

APPENDIX VI—TERRESTRIAL PLANT ASSAYS

(A) SEED GERMINATION BIOASSAY PROTOCOL

(1) Seeds (radish, *Raphanus sativus* 'Early Scarlet Globe') sieved to reduce germination and growth variability. Mesh size: 2.36 mm, 2.00 mm, 1.70 mm (U.S.A. standard testing sieves). One size category used per bioassay.

(2) 100 ml extract solution diluted 1:10 put in chamber (Figure 2), blotter paper placed upright to absorb solution.

(3) 150 radish seeds placed in position;

saturated paper laid over them and gently pressed until impression seen.

(4) Second Plexiglas sheet positioned so seeds and blotter paper sandwiched between; Plexiglas taped securely on sides and top (see Figure 2).

(5) Unit then put in germination chamber.

(6) Environmental chamber (temperature 25° C, no illumination) houses germination chamber for 48 hrs.

(7) Length of hypocotyl measure after incubation.

(8) Standard T-test used to compare dosed seeds to control.

(b) SEEDLING GROWTH STUDY PROTOCOLS

(1) Seedling growth studies are run using wheat (*Triticum aestivum*) and soybean (*Glycine max*).

(2) The seeds are soaked for approximately 3 hours in deionized water.

(3) 200 ml of soluble plant food with trace elements (1 tbs per gal water) is added to approximately one liter of sand (acid-washed quartz sand to pass 60 mesh sieve, leached by triple rinse in distilled water) in which the seeds are planted, 25 soybean and 50 wheat seeds per container.

(4) When the seeds have sprouted (about 72 hrs) the extract diluted 1:10 is added in droplets. Constant pressure is applied via compressed air tank to test solution in a plastic bottle. Solution is forced through tygon tubing to a polyethylene nozzle (inverted buchner funnel). The volume is regulated with a screw clamp adjusted to a flow rate of 6 ml/sec. This design is simple and disposable or acid washable in order to assure ready availability of component parts which are easily cleaned between test runs.

(5) Seedlings are exposed daily to a dose sufficient to restore loss by evapotranspiration.

(6) At the end of 2 weeks of exposure plants are harvested and the following parameters are measure:

(i) Root biomass.

(ii) Shoot biomass.

(iii) Gross pathology (i.e., necrosis, chlorosis).

(C) RESULTS

Comments are specifically requested concerning the significance of these indicators as measures of damage.

[65601-01-C]

Figure 1

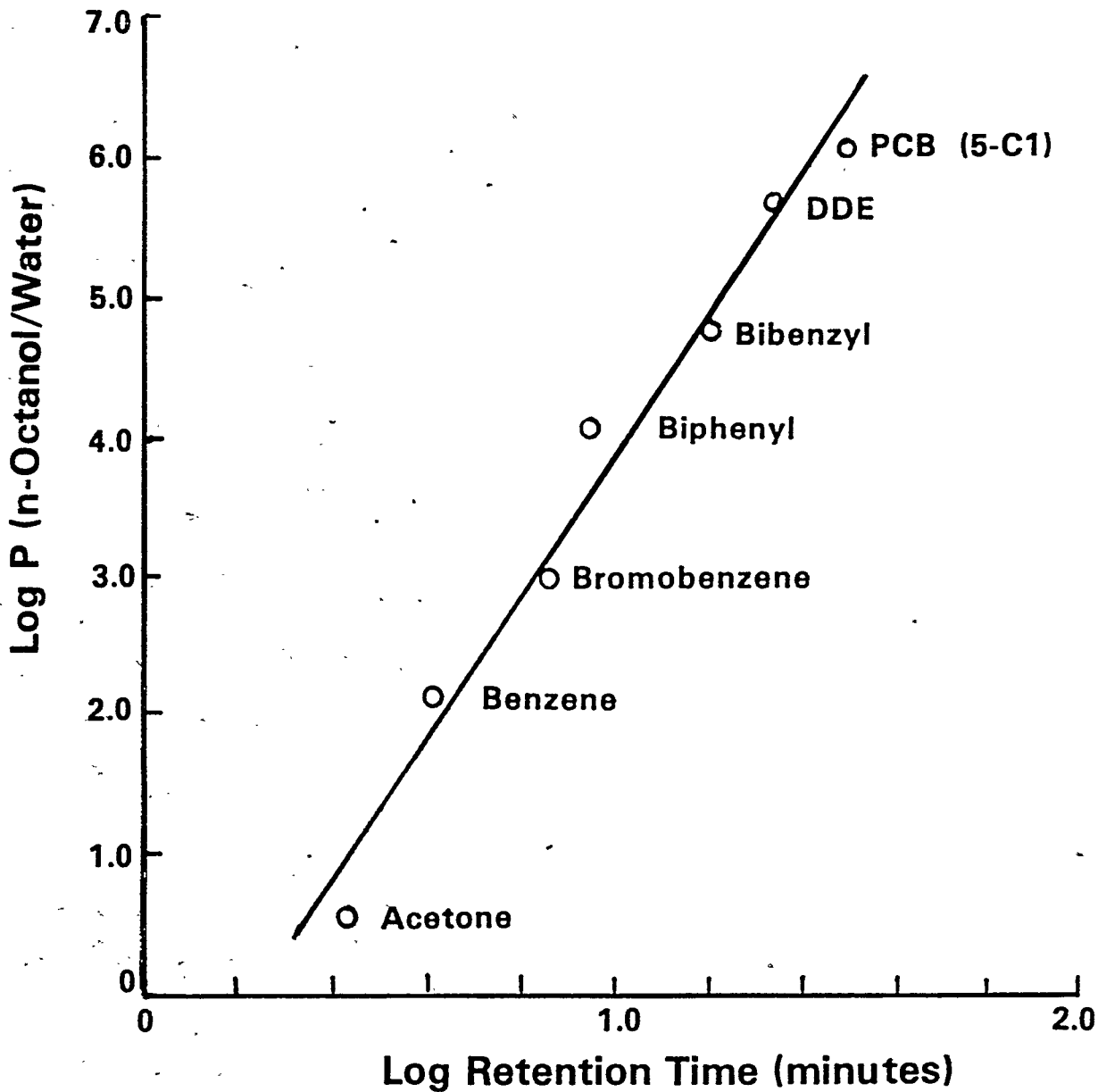
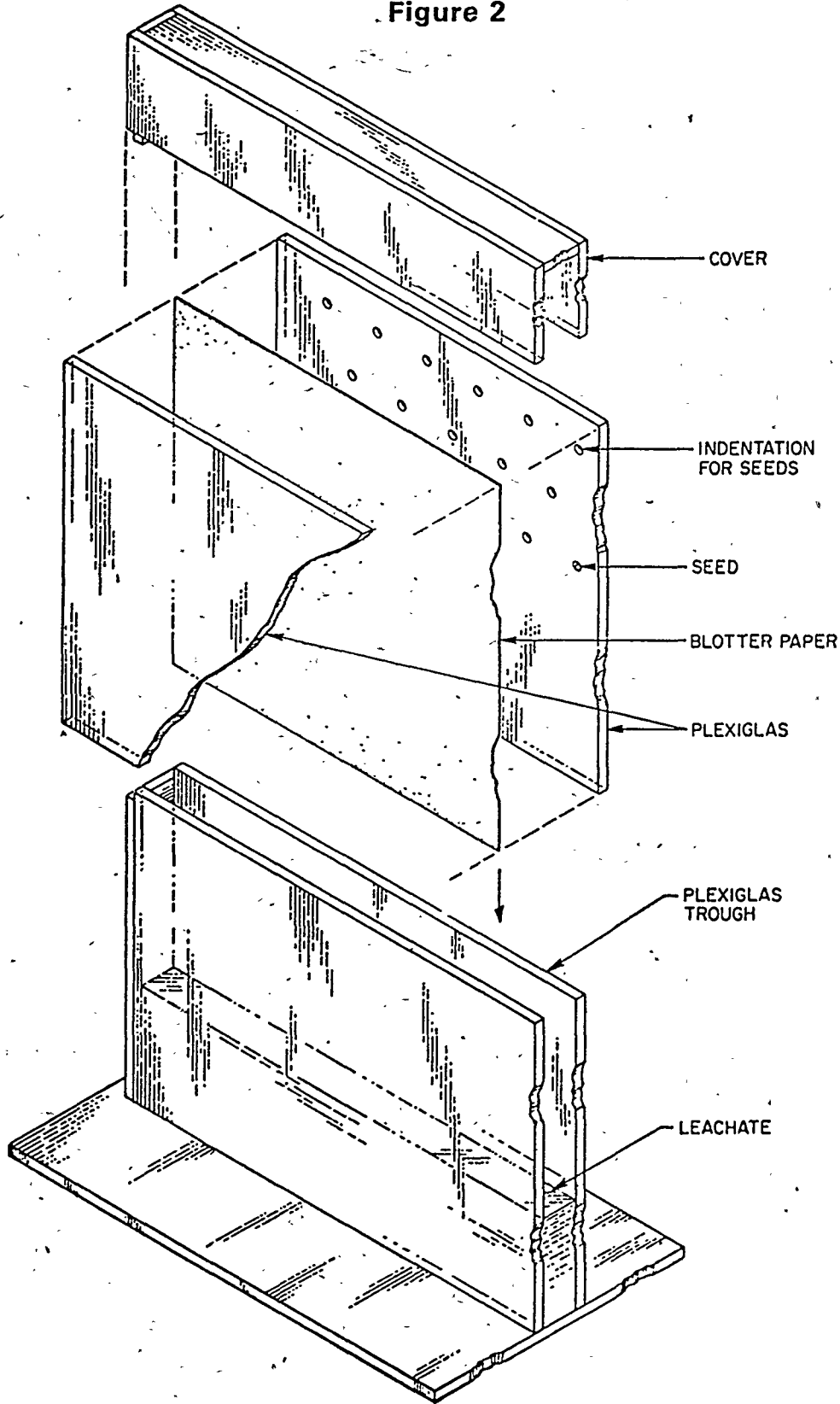




Figure 2



[FR Doc. 78-34904 Filed 12-15-78; 8:45 am]